



KNOW YOUR HEART Pg 43

Personal  
Computers  
Pg 54



March 2006

# Science Reporter

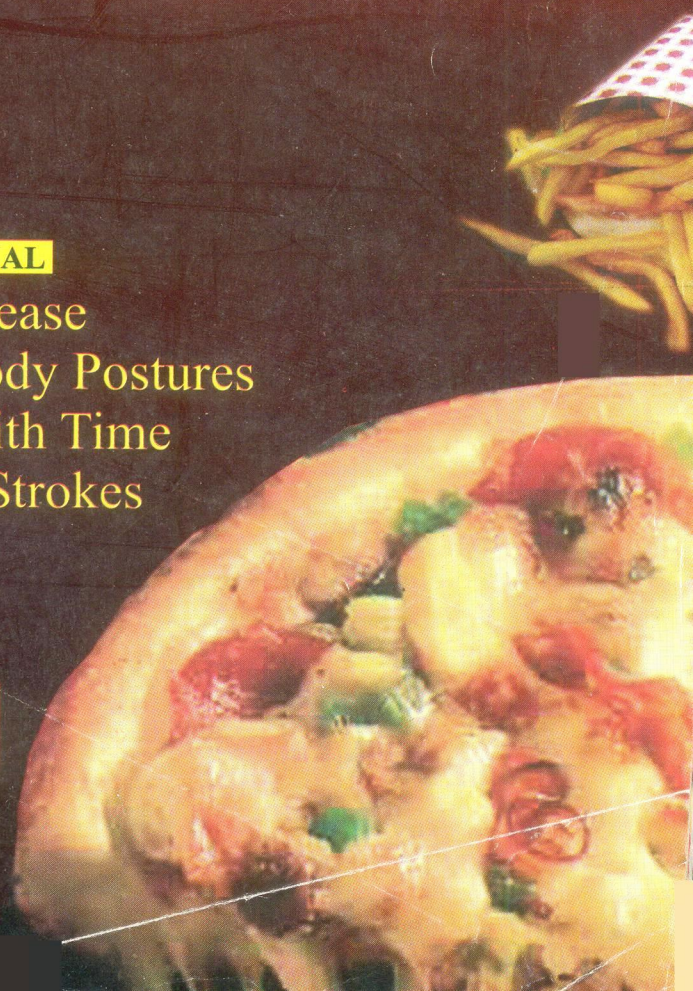
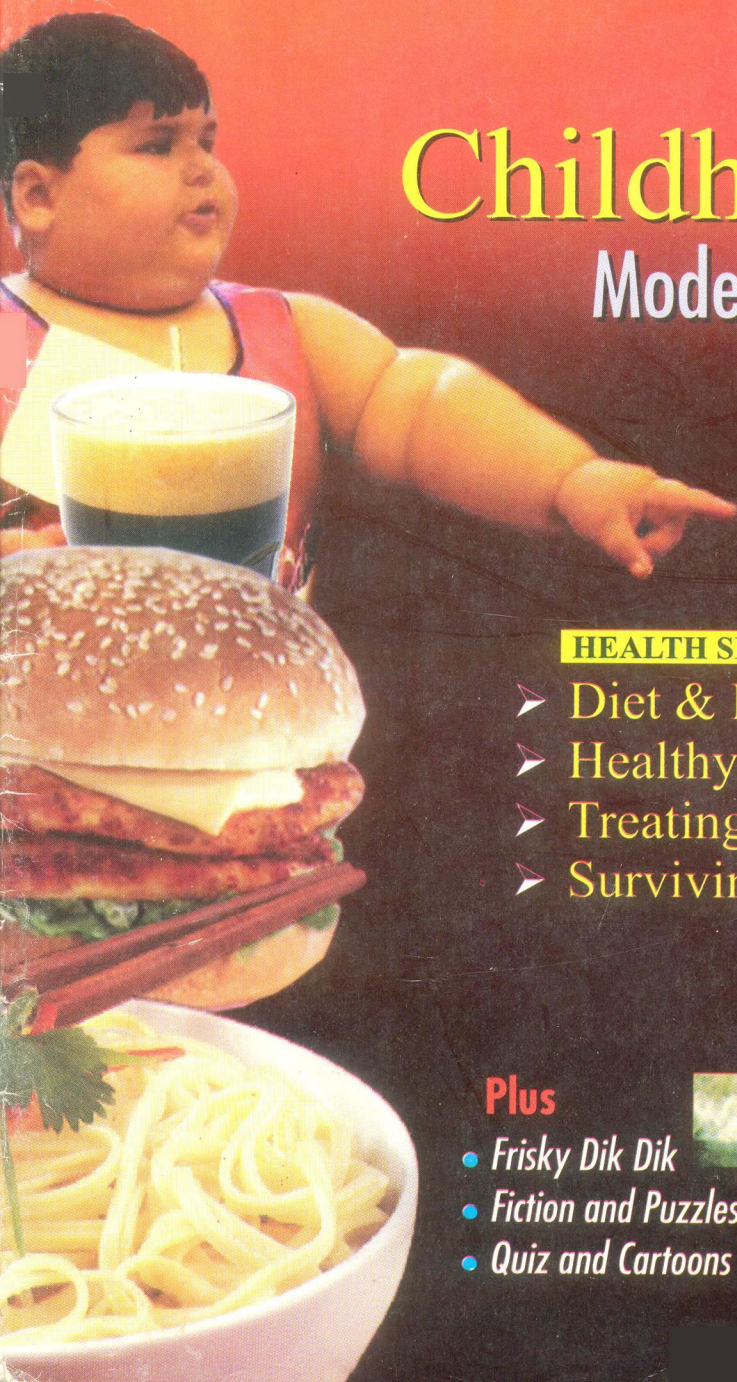
## Childhood Obesity Modernity's Scourge

### HEALTH SPECIAL

- Diet & Disease
- Healthy Body Postures
- Treating with Time
- Surviving Strokes

### Plus

- Frisky Dik Dik
- Fiction and Puzzles
- Quiz and Cartoons







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## China's Long March

The success of Shenzhou-6 has been reported in **Spectrum** (SR, December 2005). This feat highlights China's status as a rising world power with triumphs to match its economic growth. The confidence of the government is borne by the fact that the launch was shown live on television. Probably, the success of the previous Shenzhou launch was responsible for it. It is apparent that China has come a long way from the development of its Long March rockets way back in the sixties. It is now the third country, after Russia and the United States, capable of manned launch. China intends to pursue its space ambitions vigorously by putting female astronauts in orbit, erecting its own space station and exploring earth's natural satellite.

Dr S.K. Gurtu  
Jaipur

## More Maths Coverage

I am a regular reader of your esteemed magazine. The magazine is doing a great job in the field of science popularisation. The magazine covers wide areas related to Physics, Chemistry, Biology, Biotechnology, Information Technology etc. But I would like to draw attention to the fact that the coverage of Mathematics in the magazine is quite less. I remember two articles pertaining to Mathematics that appeared in the magazine. One was named 'Do You Like Mathematics' and the other was on Vedic Mathematics. But it was a long time back. Recently no Mathematics articles have appeared. Mathematics is the foundation of all science and as such steps need to be taken for its popularisation. And in this respect the magazine can play an important role. It will especially be helpful in dispelling the 'Maths Phobia' in the

younger generation. I would like to suggest the beginning of a new section solely devoted to Mathematics in the 'Junior Scientist' section.

Biplob Sarkar  
Guwahati (Assam)

## Healthy Advice

I am a regular reader of this very informative magazine. There is always something new in the magazine. This time I was amazed to read about the benefits of almonds by Dr Nikhat Manzoor. It sounds great to my mom too when issues like these that help us keep healthy are published. Nowadays we all are talking five almonds daily. I liked the science fiction "Hair of Derkowitz" too. It was really interesting. I hope issues like these are published more in the future.

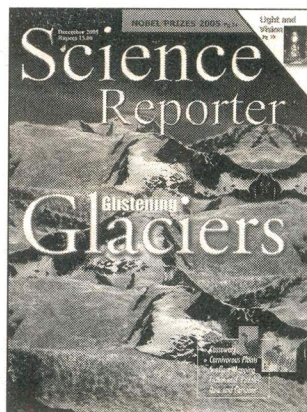
Aamir Fahim  
Class XI, Jamia Sr. Sec School,  
New Delhi

## Fascinating Issue

The December issue of *Science Reporter* was really fascinating as it threw light on the important issue of melting glaciers due to global warming. The features 'Cassowary' and 'Seeing is Believing' were too good. I started reading *Science Reporter* from October 2005 and liked that issue the most as it was devoted to Astronomy, my favorite subject. I look forward earnestly to see more such 'Astronomy Special' articles in future. I also thank the editorial team of *Science Reporter* for

## HAVE YOUR SAY

If you feel strongly about any article published in *Science Reporter* or have some information to share with the readers, please write to us at the postal address given in the magazine or send an Email at [sr@niscair.res.in](mailto:sr@niscair.res.in).



giving a brief account of Nobel Prizes-2005.

Mitali M. Damle  
Dombivli

## Appreciating SR

I would like to thank and congratulate the team of *Science Reporter* for their Herculean efforts in spreading scientific awareness among young readers through a diversity of scientific articles. The cover story of November issue, **When the Earth Shook**, and the article on

"Mulberry and Silkworm" along with all the regular appearances really deserve appreciation.

Mani Mahesh Garg  
Hanumangarh

## Super Hit

I started reading *Science Reporter* since the last three months and I have also subscribed for a regular copy of this magazine. According to me, this magazine is fabulous and the feature articles are really splendid. The fiction column is the most interesting one. I read the story published in the November 2005 issue, **CLONESTEIN**, and I was really fascinated by the twists and the thrill that was in the story. I thought that the story would end in the typical Indian way with a happy ending for the hero. But when I realized that the professor was sent to space by the clone, I was taken aback. I think this magazine is super hit!

M. Avinash  
Ghaziabad (U.P.)

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## The Eagles Have Landed!

BIRD flu, the much-dreaded disease seems to have finally landed on Indian shores. It had been making news in several parts of the world for the past one year. And after months of speculation and hopes that perhaps it just might give the go-by to India, it has ultimately struck. The poultry industry is up in arms, understandably, trying to pass off the bird deaths in Maharashtra as caused by Ranikhet disease that has similar symptoms as bird flu. Conspiracy theories and allegations of MNCs trying to cash in by creating a panic situation also abound.

The government, however, has asserted that it is bird flu indeed. Over five highly advanced virus detection tests were conducted on bird samples from the stricken area in Maharashtra. A specific serum that can differentiate between Ranikhet and H5N1—the avian flu virus of concern at present—was also used for confirmation. The tests were carried out at the High Security Animal Disease Laboratory at Bhopal. The Bhopal testing and diagnostic facility is only the fifth of its kind in the world, and the first in a developing country. The others are in Australia, the Netherlands, the United Kingdom, and the United States.

For now, panic has set in with lakhs of birds being put to death in a ten kilometer radius around the bird flu struck farm in Maharashtra. Chicken has gone off the menu throughout the country and egg prices have plummeted. What makes the virus dangerous is that it is highly contagious and deadly too. Besides, it keeps mutating or changing its colours making it difficult for medical researchers round the world to come up with a sure shot cure. The virus spreads through clothes, vehicles, instruments etc used in the poultry. Generally, wild migratory fowl are the reservoirs of the virus, which shed the flu virus with their saliva, faeces and nasal secretions as they fly overhead on their migratory route or when they stopover at places. From there the virus passes on to ducks, which in turn spread it among the domestic poultry. The situation becomes extremely dangerous in countries like India where keeping poultry and ducks is a way of life and in view of the highly densely packed nature of our poultry farms it is inevitable that the infection would spread fast.

Although human deaths have so far been few and far between, going by the nature of the bird flu virus, the rapidity with which it spreads and the potential fatal blow it inflicts, a bird flu pandemic could become a serial killer in the days to come. According to the United Nations, a serious outbreak had the potential to kill almost 150 million people. Not surprising, considering that a Spanish flu in 1917-18 killed almost 50 million people. According to the World Health Organisation, this was the most serious health threat that the world was facing today. In fact, the WHO has already warned that an outbreak is almost certain to occur if not within months then within a year or two. It is now only a question of when it will occur.

With the virus evolving continuously, it is only a matter of time that human-to-human transmission starts. Once this gets rolling the situation could become even more serious especially in countries of Southeast Asia where large and densely packed populations could facilitate easy and fast transmission of the virus. There is no need to panic as of now since no human infection has been confirmed in India. Often there is a tendency to go in for preventive medication in such cases. But this could only lead to people becoming resistant to the drug. Although an effective drug, Tamiflu, does exist to combat avian influenza, it could have serious side effects if taken without medical supervision. For now, therefore, it is better to be cautious and alert.



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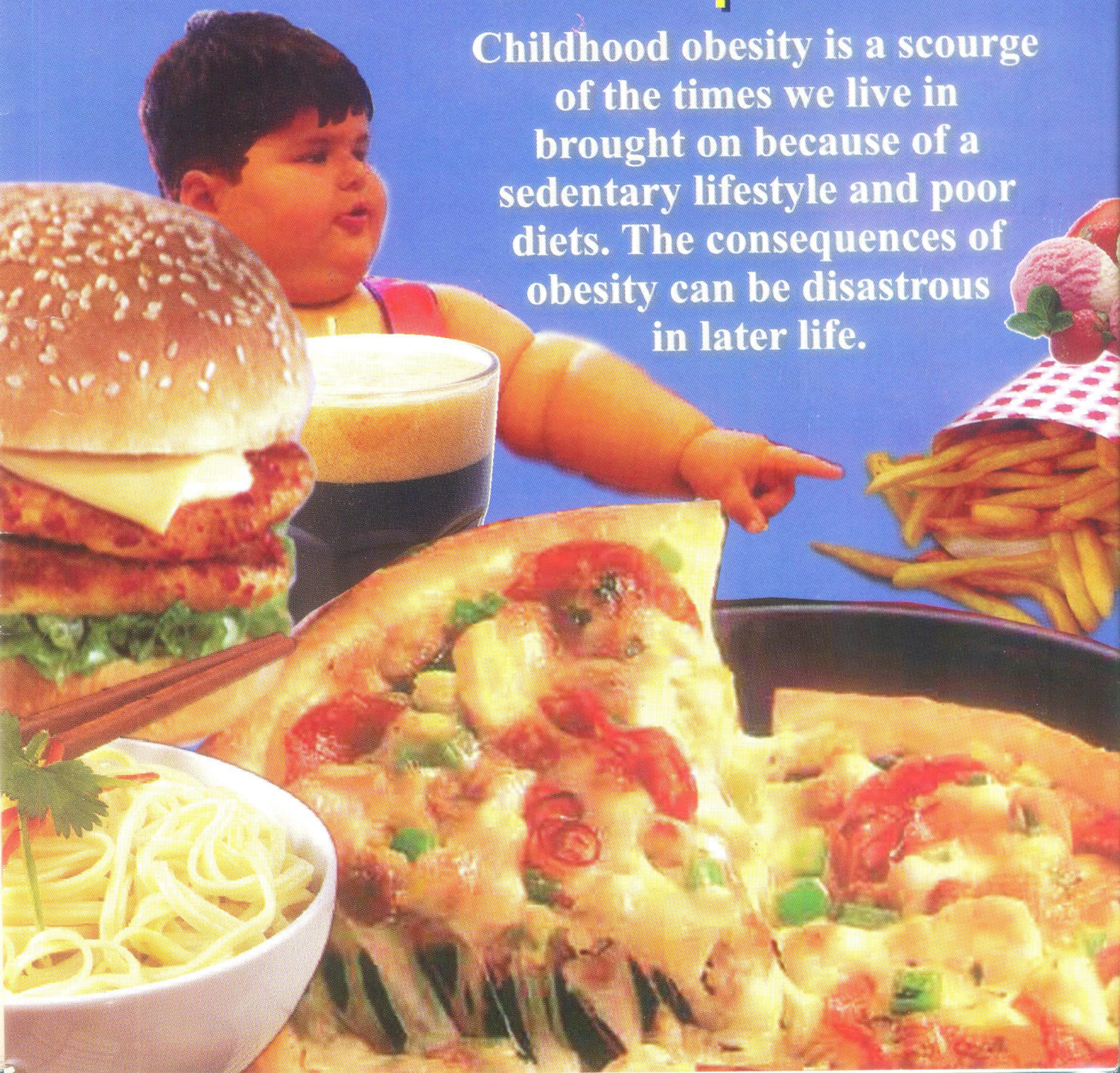
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# Childhood Obesity

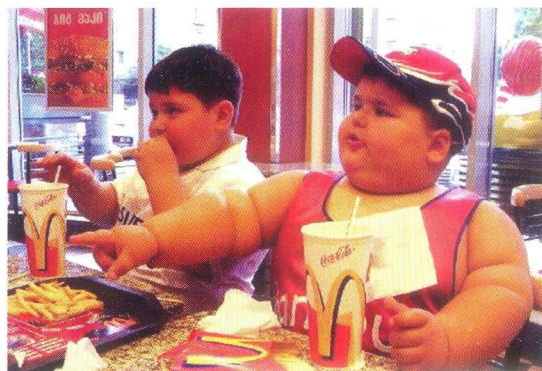
## Act Now Or Repent Later!

Childhood obesity is a scourge of the times we live in brought on because of a sedentary lifestyle and poor diets. The consequences of obesity can be disastrous in later life.





**Besides lack of playing in the ground the increasing popularity of fast food and eating away from home is becoming more common.**



***“Healthy eating and an active lifestyle should be a way of life rather than a therapeutic approach in the management and treatment of obesity.”***

**W**ITH kids today spending more time in front of their computer and television screens, their physical activity levels are decreasing. And their weights are increasing. After being recognised as a global epidemic, childhood obesity is beginning to make its presence felt in India too.

This has come about due to a couch potato lifestyle coupled with poor and faulty dietary practices. Surrounded as they are by an obesogenic (obesity promoting) environment, which provides all the technological amenities, the young today are at great risk of becoming overweight, the consequences of which may be disastrous enough to outweigh the comfort and luxury.

Overweight or obese children are at a greater risk of growing up to be overweight or obese adults. Obesity also poses a major risk for serious diseases such as diabetes mellitus, cardiovascular diseases, and some cancers.

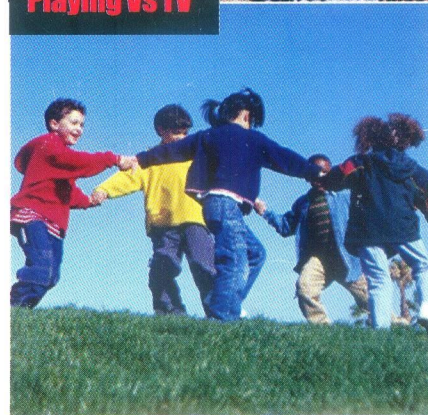
For this reason, many countries are looking toward prevention efforts for children, rather than focusing solely on treating the obesity that already exists. In the United States the problem is clearly evident among children. The Centers for Disease Control and Prevention (CDC) reports that 25% of children ages 2 to 20 years are, or are at risk of becoming, overweight or obese—twice the rate of obesity seen just a decade ago. In India too childhood obesity dare not be taken lightly (See page 14).

### How is Obesity Caused?

Childhood obesity, just like adult obesity, is caused by an imbalance between calories-in and calories-out. This is further compounded by complex social factors that influence how children eat, exercise, and play.

Obesity results due to excessive deposition of fat in adipose tissue (fat cells), which occurs when a person's energy intake (calories consumed through food and beverages except water which provides zero calories!) exceeds his energy expenditure (calories burnt as a result of physical activity). The excess calories consumed are then converted into fat and stored in the body.

One does not become overweight in a short span of time. A person may put on weight gradually due to a persistent high intake of energy over a period of time. This is why losing weight is a gradual process and requires



### Global Childhood Obesity

- Approximately 20% of Australian children and adolescents are currently overweight or obese
- Obesity is highest in the wealthiest, city-dwelling Chinese, where one in every ten children is considered obese
- In Chile, 30% of children are overweight or obese
- Only 45% of 11 year old English boys and 37% of girls report exercising two hours a week or more
- About half of European adults will be obese by 2030, partly because of an emerging epidemic of obesity among children and adolescents

Sources: Food and Agriculture Organization, World Health Organization, Australian Associated Press



**Children today are more likely to consume fast food items like noodles, pizza, burger and French fries frequently.**



long-term changes in the diet and lifestyle of an individual. Obesity primarily results due to two reasons: Genetics and environmental factors, which play a major role in causing obesity.

While it is difficult to overcome genetic factors, one can have some control over the environmental factors. These factors include the type of lifestyle one follows and the type of food one consumes.

### Dietary Fallouts

Eating away from home is becoming more common. The increasing popularity of fast food is partly due to the fact that more women are today venturing out to work. So there is less time available for elaborate food preparation. Hence, children today are more likely to consume fast food items like noodles, pizza, burger and French fries frequently.

But consumption of these items puts them at risk of developing obesity due to the high energy density of such foods. Moreover, research shows that children

who frequently consume fast food have diets poorer in nutritional quality as compared to those who eat fast food less frequently. A packet of noodles is more likely to be available in an average household but fruits are rarely seen. These items are generally more preferred by children and mothers especially working women, as they are easy and are quick to prepare. They also suit the pocket as well as the taste buds of one and all.

Increased soft drink consumption not only provides empty calories but also puts an individual at risk of nutrient deficiencies. Studies have shown that increased soft drink consumption displaces more nutritious beverages like milk and fruit juices from the diets of children. This can lead to deficiencies of Calcium and Vitamin C apart from being linked to childhood obesity.

### Lifestyle Fallouts

There are many sedentary pursuits available today such as television, video games, computers and the

Internet leading to physical inactivity. Children today spend more time in such passive behaviours such as prolonged TV viewing, working or playing games on the computer, surfing the Internet, talking on telephone etc. All these activities contribute to the development of obesity by displacing physical activity and energy expenditure.

Besides, while pursuing such passive activities children often also indulge themselves in frequent snacking and overeating. Often children spend their time in front of the TV eating high fat or high sugar foods such as chips and chocolates. The fatty or high sugar foods combine with low activity levels to contribute to obesity in the children.

Moreover, the more children watch TV, the more likely they are to watch misleading advertisements promoting foods that are generally rich in fats and sugar. Advertisement campaigns that involve celebrities excite and influence the children. It is a well-known fact that ads that promote energy dense foods such as aerated





**The exercises keep you going for a longer time and also help you concentrate much better in your studies.**

**Encourage your child to participate in sports and other co-curricular activities, which will increase his/her physical activity.**

drinks, chips, burgers, ice creams and pizzas have models with great figure rather than a fat and sloppy person. Thus, these ads disillusion young minds that may lack the discretion to think about the possible consequences and health hazards associated with the frequent consumption of these high-energy foods.

Children and the youth also undergo a lot of stress due to the pressure of studies and their parents' high expectations. In a stressful situation or when emotionally upset, many of them resort to binge eating (eating excessively) in order to suppress their feelings. This habit eventually leads to obesity in the long run.

## Consequences of Obesity

Obesity in childhood and particularly in youth is a key predictor of adult obesity. According to the *International Journal of Obesity*, 2002, it has been estimated that 40%-70% of obese children and youth go on to become obese adults. Obesity during childhood and adolescence predisposes one to adult obesity, which then opens the door to an array of diseases such as chronic degenerative diseases like cardiovascular disease, diabetes mellitus and cancer etc. besides stroke, orthopaedic problems, gall bladder diseases, pulmonary (breathing) and skin disorders.

Overweight also affects the psychosocial health of an individual leading to poor body image, lower self-esteem, chronic rejection from peers, sadness, depression, loneliness and lack of confidence, which eventually decreases the quality of life. Overweight children may find it difficult to perform simple day-to-day activities as overweight reduces a person's efficiency.

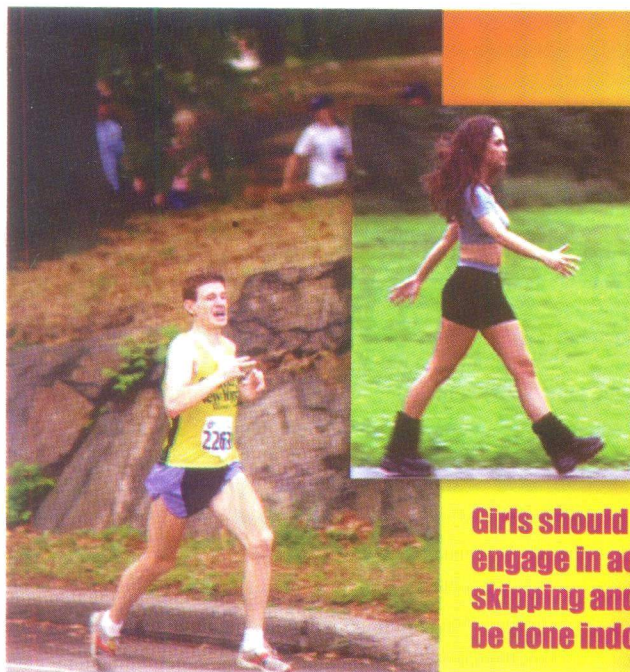
They may also suffer from health problems like asthma. Obesity adversely affects the academic performance of an individual and may, thus, be a threat to one's career. Also, employers generally do not have a favourable attitude towards overweight/obese candidates, as their productivity is low and they are more prone to illnesses.

## Parents Take Charge

Parents play a pivotal role in shaping the attitudes of their children. Since habits are acquired early in life and are difficult to change as age advances, it is essential that parents inculcate good habits in their children during the early formative years when it is easier to mould the young and impressionable minds in the right way.

Children are very observant as well as receptive to new ideas unlike adults who have a definite mindset. Hence, parents need to adopt good healthy habits if they want to set a good example for their children. There are a few things that need to be kept in mind by parents:

- Encourage your child to eat a well balanced diet consisting of cereals like rice, chapatti made out of whole wheat



**Spare at least 30 minutes every day for some kind of physical activity like brisk walking, jogging or running.**

**Girls should be encouraged to engage in activities like skipping and dancing, which can be done indoors.**



## **Stay focused on being healthy, not thin.**

### **Be active and have a well-balanced diet.**

flour, dals, vegetables, salads, milk and milk products such as curds, buttermilk and cheese and seasonal fruits in the right amount and proportion. Use fats, oils and sugars sparingly.

■ Do not reward your child with any food item like chocolate and candy. Instead of rewarding him/her materially, encourage your child verbally.

■ Set limits for TV viewing, playing computer or video games. If possible, remove sedentary alternatives and encourage the child to play outdoor games.

■ Generally it is seen that girls are more physically inactive than boys during puberty and adolescence. Hence, girls should be encouraged to engage in activities like skipping and dancing, which can be done indoors. Encourage your child to participate in sports and other co-curricular activities, which will increase his/her physical activity.

■ Do not stock your refrigerator with goodies like chocolates, chips, ice creams, pastries and patties, as this will only spoil the food habits of your child who may later find it very difficult to give up such dietary practices. Allow your children to partake of such items only once in a while. Instead keep items like fruits, fruit juices, buttermilk, sprouts, roasted *chana*, *chivda* and other healthy snacks for your children.

■ If you are a working mother and can spare enough time to cook a packet of noodles for your child, then you can surely cut fruits for a fruit salad. Adopt healthier options that will benefit your child and also save your time.

■ Suggest the school authorities to remove vending machines providing fast food items like chips, patties, coke etc. and instead keep health drinks like buttermilk, fruit juices, mango *panna* and healthy snacks like vegetable sandwiches, sprouts *bhelpuri*, *poha*, *idli sambar* and vegetable rolls made out of whole wheat flour *chapatti* stuffed with

vegetables and so on to encourage healthy eating. Moreover, such items can be easily prepared at a low cost compared to fast food, which is more expensive and bad for the health too.

■ Last but not the least, spend quality time with your children, listen to their worries and problems, encourage them to openly express their feelings so that they may not depend on food for emotional comfort. Your love, care and support are more important for your child's well being than anything else.

### **You Are What You Eat**

But children too need to take their life in their own hands. They need to chart out a course for their later life well in advance. And this includes following healthy dietary practices and not indulging too much in food that fills up but also harms. Here are some tips for you to start off on the road to a healthy future:

1. Start your day with a good breakfast to keep up the energy levels. You will not only stay alert and energetic throughout the day but will be able to concentrate better on your studies. If you spare just 5-10 minutes every morning for your breakfast, you can score better than your classmates and will surely succeed in beating your rivals!

2. While eating out, steer clear of soft drinks especially cola and other aerated drinks as they have a very high sugar content and provide empty calories. Instead, go for fruit juices and milkshakes that are nutritious and healthy.

3. For those who have a sweet tooth and love gorging on sweets and chocolates, there is a healthier option. You can have fruit custard and fruit salad more often instead of sweets and chocolates that have a low nutritional and a high calorific value. Fruit-based desserts will not only satisfy your taste buds but will also supply a good amount of protective nutrients such as vitamins and minerals.

4. Fatty foods prolong digestion and make you sluggish and lethargic. So while eating out, eat more of salads, soups, grilled vegetable sandwiches and roasted items. Choose low calorie dishes as far as possible especially if you eat out frequently.

5. Eat lots of fruits and vegetables for an adequate intake of vitamins, minerals and fibre. Add sprouted pulses like Bengal gram (*chana*) and whole green gram (*moong*) to salads and *bhelpuris*.

6. Avoid combining eating with any other activity like reading or watching TV as one tends to eat more while engaged in such activities.

7. Avoid nibbling in between meals. Eat small and frequent meals rather than three large meals. Make sure that there is not too much gap in between two meals, as this will make you feel hungrier.

8. Instead of *samosas*, chips, cream biscuits and wafers, pick up a fruit like apple, pear or banana when you feel like snacking.

9. Eat a wide variety of foods. Avoid eating processed foods and eat foods in their natural form.

10. Eat slowly and chew your food properly. This will not only aid in digestion but you will also eat less.

11. Exercise moderation in consumption of refined foods made out of *maida* or white flour like noodles, burger and other bread items. Processed foods are rich in sodium and are mostly prepared from hydrogenated vegetable oils, both of which are bad for your heart. If at all you have to eat bread, then switch over to fibre-rich brown bread made out of whole wheat flour.

12. Fried and fatty foods like *samosas*, patties, *pakorras*, *namkeens*, chips and French fries can be eaten once in a while for a change but such items should not be part of your regular diet.

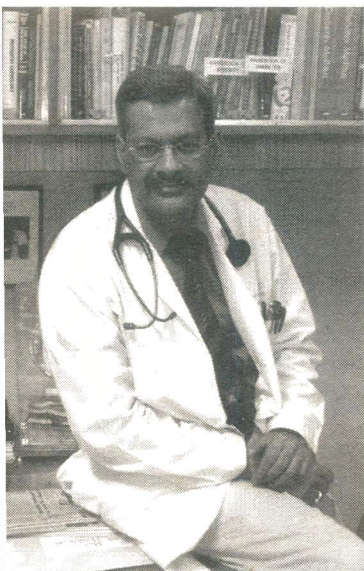
13. Become nutrition savvy. Read food labels while buying a food product. Develop the habit of reading nutrition facts. This will help you in the long run to make a judicious choice.

14. Respect your food by avoiding any wastage. This doesn't imply that you have to adopt a "clean your plate" policy but more importantly select small portions of food so as to avoid overeating as well as wastage of food.

15. Avoid oily and fatty dressings like mayonnaise on salads. Instead use whipped curd, lemon juice with salt and pepper or *chat masala*.

(Continued on page 33)





**DRANOOP MISRA** is Professor of Internal Medicine, and a specialist in Diabetes and Obesity in the Department of Medicine, All India Institute of Medical Sciences (AIIMS), New Delhi. He has served as WHO consultant for the National Diabetes Control Program for DPR Korea (2005) and a member of the WHO Expert Committee on Childhood Obesity (2005). Dr Misra is an Editorial Board member for several international journals including: 'Nutrition, Metabolism, and Cardiovascular Diseases' (Italy); 'Metabolic Syndrome and Related Disorders' (USA); 'International Diabetes Monitor' (Sweden), and 'Medical Science Monitor' (USA). Dr Anoop Misra talked to **HASAN JAWAID KHAN** about the recent study that his team at AIIMS carried out on obesity, the various factors leading up to childhood obesity and the role of diet in preventing obesity.

## *“Need to Check Dietary Westernization”*

**Until now childhood obesity was a problem that many believed was confined to the West. But your study seems to indicate that we also have a similar problem at hand. How serious is the problem?**

At a recent meeting of the World Health Organization Expert Committee on Childhood Obesity, the problem was discussed from the perspective of both developed and developing countries. It was clearly evident that childhood obesity is increasing in developing countries that are undergoing rapid nutritional and lifestyle transition. In India, this is seen as a recent phenomenon, mainly confined to urban and suburban areas. According to our recent study, which has been published in the *International Journal of Obesity*, 1 in every 5 urban child is suffering from either overweight or obesity. Given the already high prevalence of obesity-related diseases in India, these figures should be viewed with serious concern.

**Children's extra fat is often dismissed as baby fat. It is believed that the fat would magically disappear after babyhood. Are there any early signs of obesity that one could make out in children?**

This is a misconception. In Indian context, every fat baby is considered to be “healthy” and supposed to reflect that he/she was born in a family of “affluence”. Also considering prevalent attitudes of mothers that the babies should be overfed, it is often seen that the “baby fat” persists throughout childhood and then in adolescence. By this time it is too late to lose it, or it requires extra efforts and considerable discipline to control it.

“Fat appearing” children need to be examined by a physician. This particularly applies to females. Obese boys may have fat over the face, neck and over the breasts (“gynecomastia”), and roughening and dark pigmentation of skin over the nape of the neck (“acanthosis nigricans”). Females, besides having extra fat all over, may suffer from

excess facial hair (“Hirsutism”) and acne. They may also complain of menstrual irregularities.

**What are the main factors leading up to childhood obesity?**

The main factors are the following:

1. Dietary indiscretion
2. Sedentary lifestyle: This would include no aerobic exercise or sports, excess TV viewing, Internet surfing and video games
3. Behavioral disorders
4. Pathological states resulting in obesity (small percentage, e.g. dysfunctional thyroid)
5. Hereditary predisposition (obese parents)
6. Genetic disorders causing obesity (rare)

**Is it true that the fast food culture has a lot to do with obesity?**

It is correct to say that “energy-dense food” (“fast foods” in common parlance) is the singular most important cause of obesity during the teenage years. It is a matter of serious concern that the food choices of adolescents are rapidly changing towards “dietary westernization” which mostly consists of high energy containing packaged foods. In our recent study, we observed that 1/3<sup>rd</sup> of the children in Delhi are eating in fast food outlets or similar food outlets more than three times a week. Their cola consumption was unusually high. Moreover, the school canteens also contain such food items, resulting in almost daily consumption by children.

**Do we need to take childhood obesity more seriously than adult obesity?**

Yes, we should. First the lifestyle habits leading to obesity are imprinted right in the childhood. Once an obese child becomes an obese adult, it is extremely difficult to correct those ingrained habits. Furthermore, psychological impact of obesity during childhood may be more devastating than in adults. Once complications of childhood obesity set in early (e.g. diabetes), the consequence could be serious.



## Obesity Study

According to the study carried out on 1900 schoolchildren in New Delhi by Dr Anoop Misra's team:

1. The prevalence of overweight was 17%.
2. Approximately 16-18% had abdominal obesity. Fat under the skin (subcutaneous fat) was also high, portending high risk for development of cardiovascular diseases and diabetes.
3. These children also had very high prevalence (males 24%, females, 36%) of syndrome X.
4. Further 7% of boys had evidence of hypertension.
5. Thirteen per cent of these children also had high levels of C-reactive protein, which is a new factor and has been shown to accurately predict diabetes and heart attacks.
6. The diets of the children were totally imbalanced, with fewer intakes of the beneficial nutrients. There was high intake of energy dense fast foods.
7. Almost 2/3<sup>rd</sup> of the children were sedentary.

### What are the chances that an obese child would grow into an obese adult?

Any child who develops obesity during the second decade of life has 50-70% chances of remaining obese in adulthood. Further, it is a misconception that obese children in their first decade of life would lose fat once they grow. Scientific studies have shown that 20-40% of these children would also grow up as obese adults.

### And what is the extra baggage that this obesity entails—in terms of diseases and other physiological conditions as well as psychiatric disorders?

Obesity is the harbinger of numerous diseases. Some manifest right in the childhood, such as excess facial hair, menstrual irregularities, psychological problems, diabetes, and even high blood pressure. During early adulthood, obese persons are certain to suffer from diabetes, hypertension, heart disease, and high cholesterol. Other problems that could develop are gallstones, arthritis, sleep disordered breathing, respiratory failure, heart failure, stroke, gangrene, fungal infections of skin, varicose veins, thyroid problems, and certain types of cancers.

### What would you recommend in terms of diet control to combat obesity? Simply keeping away from fat would do the trick? Is all fat dangerous?

The approach to the management of obesity should combine dietary restriction and increase in the physical activity. Application of either alone does not lead to desired results. Diet should be balanced, with restriction of calories, saturated fat, and unrestricted protein according to the age and growth of the child. Remember, diets in children should be designed with the help of a professional dietician, since adequate supplements of nutrients are required even in the obese children undergoing dietary counseling.

There are several varieties of dietary fat. Those that are saturated fats are not beneficial to health, while unsaturated fats are. For example, monounsaturated fat (found in olive oil, almonds, whole milk) and omega-3 fats (found in marine fishes, wheat, black gram, *rajma*, fenugreek, soyabean, walnut) are good for heart and for metabolism. A balance between various types of fats is needed in a diet designed to control and manage obesity. This should be best done with the help of physician and nutritionist.

### What is the role of parents?

Parents and teachers have extremely important parts to play. First, they should be aware of common misconceptions regarding childhood obesity, and balanced diets for children. Second, they should encourage healthy diets, limit intake of 'energy-dense foods', educate children about ill effects of imbalanced diets, encourage sports and physical activity (at least one hour per day), and limit TV viewing and video games. Most importantly, they should keep a weighing machine at home and record the weight of the child regularly. Any unusual gain of weight within a short span of time should be viewed with concern, and should necessitate consultation with a physician.

### You are involved in a few community programmes for health education and obesity. Could you tell us something about these programmes? How could those interested associate with these programmes?

The following three programs have been initiated/planned by us.

**1. Project Chetna:** The Diabetes Foundation (India) and Rotary Club of Delhi South-East through the Rotary South East Charitable Foundation have initiated an awareness programme for obesity, diabetes, and heart disease, in order to inculcate healthy lifestyle and nutrition habits for schoolchildren—the first such programme in India. In this two-year project, we plan to impart health education on the above issues through lectures, posters, group discussions, and by health camps to children, parents and teachers. Our main aim is that each child should be made aware of a healthy lifestyle so that he/she does not suffer from diabetes, heart diseases and other obesity-related diseases later in life.

The salient features of the programme are:

- Presentations by eminent experts on various aspects of nutrition, obesity and diabetes
- Group discussions
- Distribution of fliers on obesity, nutrition etc.
- Health education to parents
- Setting up a healthy food stall in the school fete and canteen.

**2. World Diabetes Foundation (Denmark) Funded Project on Healthy Lifestyle in Three Cities (Delhi, Lucknow, and Jaipur):** In this three-year project, we shall comprehensively educate children about beneficial nutrients, correct lifestyle habits, and health benefits of physical activity. Three teams would work in three cities. Lectures, demonstrations and healthy cooking contests would be arranged. The messages would be disseminated by posters, fliers, and audiovisual presentations. We shall also train volunteers from enthusiastic students, and reward them appropriately.

**3. Trends of Knowledge, Attitude and Practices of Children and their Parents Towards Nutrition and Other Lifestyle Factors:** In this proposed two-year project, to be undertaken in six cities of India, we shall collect data on the current knowledge, beliefs and practices regarding various nutrients, traditional and 'western foods', exercise, smoking, and alcohol in children from large as well as small cities. Similar data would be collected from their parents. These data would be used to plan preventive strategies.

(Dr Anoop Misra can be reached at [anoopmisra.chetna@gmail.com](mailto:anoopmisra.chetna@gmail.com) or [anoopmisra@yahoo.com](mailto:anoopmisra@yahoo.com))



## GEOPHYSICS

## Ancient History Shaped by Drought

Scientists from the Syracuse University, USA have identified a major climate crisis that struck Africa about 70,000 years ago and which may have changed the course of human history.

The evidence came from sediments drilled up from the beds of Lake Malawi and Tanganyika in East Africa, and from Lake Bosumtwi in Ghana. It shows equatorial Africa experienced a prolonged period of drought. The scientists say this could have been a possible reason some of the first humans left Africa to populate the globe.

Certainly, those who remained on the continent at that time would have had to be extremely resilient to make it through such hard times.

Data from the drilling project presented at a recent meeting of the American Geophysical Union reveal that prior to 75,000 years ago, Lake Malawi, which is currently an inland sea some 550km long and 700m deep, was reduced to a couple of pools no more than 10km across and 200m deep. Worse still was Lake Bosumtwi that lost all of its water. Only a prolonged continent-wide drought could have had this effect.

Genetic studies also suggest modern human society is descended from a group of around 10,000 individuals who lived in East Africa at the time of this crisis. Immediately after its end, human populations started to expand rapidly—and many of our ancestors began moving out of Africa and into the Middle East, Asia and Europe.

## MEDICINE

## Tarnished Image of Marijuana Transformed

The infamous dreaded drug marijuana is derived from the flower of the plant *Cannabis sativa*. There are three varieties of *Cannabis*—*Cannabis indica*, *Cannabis Americana* and *Canabis mexicana*, depending upon the country of their origin. So far, more than 400 chemicals have been isolated from the plant but the main chemical that is responsible for its pleasurable affects is called delta-9-tetra hydrocannabinol or THC. Known as *ganja* in our country and *marijuana* or *marihuana* in the West, its THC content is about 5%, but can be refined to a higher quality containing 10 to 15%.

Besides hallucination and the associated symptoms, marijuana is also capable of inducing a number of

psychological as well as physiological disorders. However, recently researchers at the University of Saskatchewan in Saskatoon, Canada have discovered that a chemical in it can induce new brain cell growth.

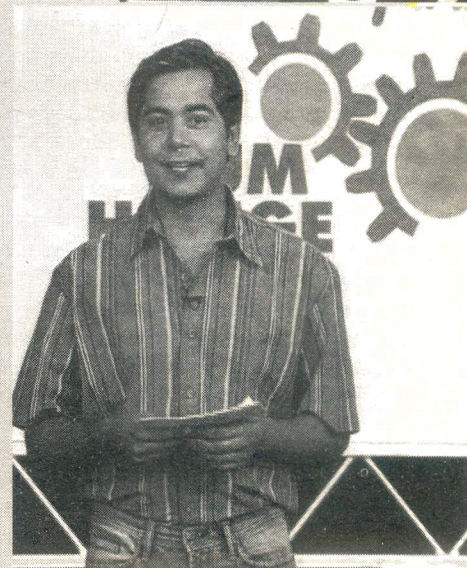
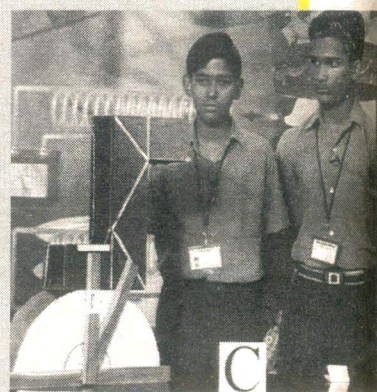
According to the leader of the team, Xia Zhang, an injection of HU210, an active ingredient present in marijuana, can increase neuron production in the hippocampus region of brain in rats. In humans this region is associated with learning as well as anxiety and the lack of cell growth here is responsible for our negative emotions. Ingestion of alcohol, nicotine, heroin etc. depresses cell growth. On the contrary, HU210 contained in marijuana has the reverse impact.

## First Science-based Reality Show on TV

The first reality show based on a scientific theme got rolling in January this year. Taking cue from a plethora of competitive and song and dance based reality shows that have rocked the small screen in recent years, *Hum Honge Kamyab*, a 13-part television series being telecast on DD National every Saturday at 9.00 a.m., is a bold attempt to provide a platform to high school students to unleash their scientific and innovative talent. Produced by the Rashtriya Vigyan Evam Prodyogiki Sanchar Parishad (RVPS), Department of Science & Technology, the show is anchored by Gaurav Gera, popular as Nandu of the serial *Jassi Jaisi Koi Nahin*.

The real heroes of the programme are twelve teams of two students each selected after an all-India test. The teams camped at the National Bal Bhawan in New Delhi for four days where they were given challenges related to daily life. For instance, one of the challenges was development of a wave detection system that could warn people in the coastal areas of the impending deadly waves.

Help was provided to the students in the shape of a library stocked with reference books, Internet connectivity, STD facility and raw materials to make the devices. Experts too provided them guidance from time to time. Three teams competed for each challenge and were given four days to develop their innovation. On the fourth day their innovations were evaluated for scientific principles and efficiency of the device by a panel of experts and a winner announced for that particular challenge.



Therefore, it could be used to lessen anxiety and depression that are playing havoc with modern life. It can even improve memory, fight Alzheimer's disease and combat mood disorder. This could also be a good way of transforming the

tarnished image of marijuana as a narcotic drug.

Contributed by Dr Ramesh Chandra Parida, Dept of Chemistry, College of Basic Science & Humanities, OUAT, Bhubaneswar-751 003



## Smart Windows

Electrochemistry is an important part of chemistry and many technological advances come from the combination of different materials in electrochemical cells. Two electrodes separated/insulated by an electrolyte basically compose an electrochemical cell. The great variety of properties presented by polymeric materials suggest the combination of different polymers in several components of such cells, opening new opportunities of constructing high performance electrochemical devices for commercial purposes. For optical and electrochemical uses polymers find application as active electrodes (electronically conducting polymers), solid electrolytes (ionic conducting polymers) and as transparent substrates (optically transparent electrodes).

Optically transparent polymeric materials have been used for fabricating eyeglasses. Derivatives of spiroxazines or alkali halide glass compounds applied to such substrates form photochromic eyeglasses. These materials, on UV exposure change their colour and thereby reduce the intensity

of the incident radiation. In the absence of UV light the eyeglasses regain their original transparent state.

The level of coloration attainable with photochromics is fixed. A user would prefer varying levels of coloration or visibility rather than a fixed one offered by photochromics. This is possible by use of another class of "chromogenics" that are electrically activated and are also known as "electrochromics". Electrochromic describes materials that can change colour when energized by electric field. Essentially, electricity kicks off a chemical reaction in these materials. Like any chemical reaction, such a reaction changes the properties – the optical in this case – of the material. It changes the way the material reflects or absorbs light. Reversal of the polarity of the electric field reverts back the original optical state of the material. Thus, by controlling the energizing field varying levels of coloration can be obtained.

Electrochromism can be exploited in a variety of devices also called electrochromic devices (ECDs) with potential use in various applications such as information displays, as rear view mirrors and visors in the automotive industry and more importantly as windows and sunroofs in buildings and automobiles.

Electrochromic technology also makes the window "smart". It transforms the traditional "passive" window into an "active" component. It is smart because it

adapts to changing conditions, and also because it outperforms the traditional window by offering thermal and visual comfort to the occupants simultaneously saving the energy consumption on space conditioning. However, the energy required to activate such a window is extremely small. According to experts, you can run a house full of electrochromic windows for about the same amount of money that it takes to power a single 75-watt bulb.

Unlike liquid crystal and flat panel displays, which show passive modulation, electrochromism is a dynamic modulation and does not need continuous power supply saving a lot of energy. This technology has major advantages such as low switching voltage; specular reflection; requires power only during switching and exhibits adjustable memory up to 48 hours.

A smart window is a transmissive ECD in which control of the applied electric field controls the transmitted radiation to a desired level of coloration and once the direction of the field is reversed it makes the window transparent, similar to its original state. Such windows operate on a very low voltage – one to three volts and they use energy to change their condition, not to maintain any particular state.

Architectural application has fascinated scientists to perform R&D on smart switchable windows. This is in advanced stages and quite near to the production stage. Smart windows are anticipated to be the windows of the future. They will form an integral part not only of commercial buildings but also

## Green Generation

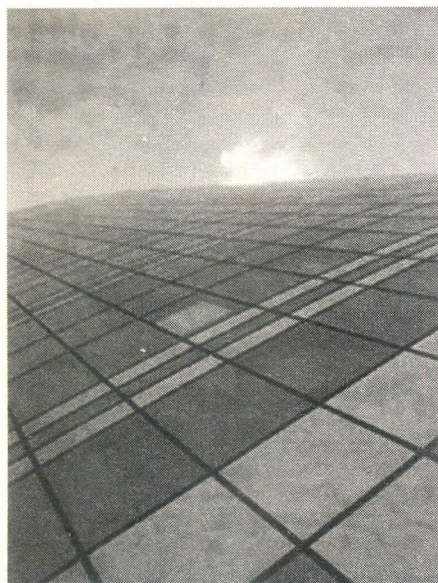
Scientists from National Taiwan University's Department of Animal Science and Technology have bred three pigs that "glow in the dark". The pigs are created by adding genetic material from jellyfish into a normal pig embryo. In daylight, eyes, teeth and trotters of these pigs look green. Their skin has a greenish tinge. In the dark, they glow torchlight bright by shining a blue light on them.



The researchers say that although the pigs glow, they are otherwise not different from any others. Partly fluorescent pigs have been bred before but these are the only pigs that are green from the inside out.

The scientists will use these transgenic pigs to study human diseases. Because the pig's genetic material is green, it is easy to spot. The pigs will boost the stem cell research also. For instance, if some of its stem cells are injected into another animal, scientists can track how they develop without the need for a biopsy or invasive test.

of residential buildings. Automotive industry will also rely upon EC technology not only for its windows but also as sunroofs and mirrors.



Contributed by Shahzada Ahmad, Senior Research Fellow & Dr S.A. Agnihotry, Senior Scientist, Electronic Materials Division, National Physical Laboratory, Dr K.S. Krishnan Marg, New Delhi-110 012



# Your Food Could Make You Sick!

**"You are what you eat." This saying becomes more evident with every passing day. Do your eating habits help protect you against serious diseases or leave you more vulnerable to them?**

**SYED HASAN ARIF**

**D**IET has a vital role in keeping you active, energetic, alert and healthy. A faulty diet could lead to several nutritional disorders. However, few know that diet has close association with non-nutritional diseases also.

Of late, the association of diet with disease has attracted much attention. Researches into dietary patterns have unfolded a complex interplay between nutrients in the diet and specific diseases. Diet has central importance in reducing or accelerating the risks related to numerous diseases. Diseases such as cancer, heart attack, hypertension, diabetes, osteoporosis, food allergy, constipation, etc. have been found to have a close link with the dietary intake.

A well-balanced diet, therefore, can reduce the likelihood of developing many health problems. Some researchers estimate that we could reduce the incidence of certain types of cancer by up to 33% if we ate more healthily. But how is diet related to disease?

## Diet Vs Disease

### Cancer

According to Prof. Hasan Mukhtar of the University of Wisconsin, USA diet has been linked to several types of cancer such as breast, lungs, oesophagus, stomach, prostate, pancreas and bladder. About one third of all cancer may be related to what we eat. However, laboratory studies

have shown that diet also contains substantial amounts of cancer preventive agents. Several derived polyphenolic compounds (an antioxidant phytochemical that prevents or neutralizes the damaging effects of free radicals) possess anticancer and apoptosis (programmed cell-death) inducing properties.

According to Prof. S. M. Hadi of the Department of Biochemistry, Aligarh Muslim University, Aligarh, the pro-oxidant action of plant polyphenols is an important mechanism responsible for their anticancer properties. Moreover, the green tea polyphenol, Epigallocatechin-3-gallate (EGCG), was found to be the most effective anticancer polyphenol.

However, family history of breast cancer, sedentary lifestyles, and diets high in saturated fat also place women at risk for breast cancer. Furthermore, pesticides have also been linked to breast cancer as for example Lindane. Studies of Prof. Javed Musarrat at the Department of Agricultural Microbiology, AMU, Aligarh showed that the agrochemical-DNA/protein adduct formation could initiate the process of carcinogenesis. Therefore, it is good to wash all fruits and vegetables before use so that all pesticide residues are removed.

Additionally, in China and Japan it was found that smoked food is related with stomach cancer, and pickled or salted vegetables with that of gastric (stomach) cancer.

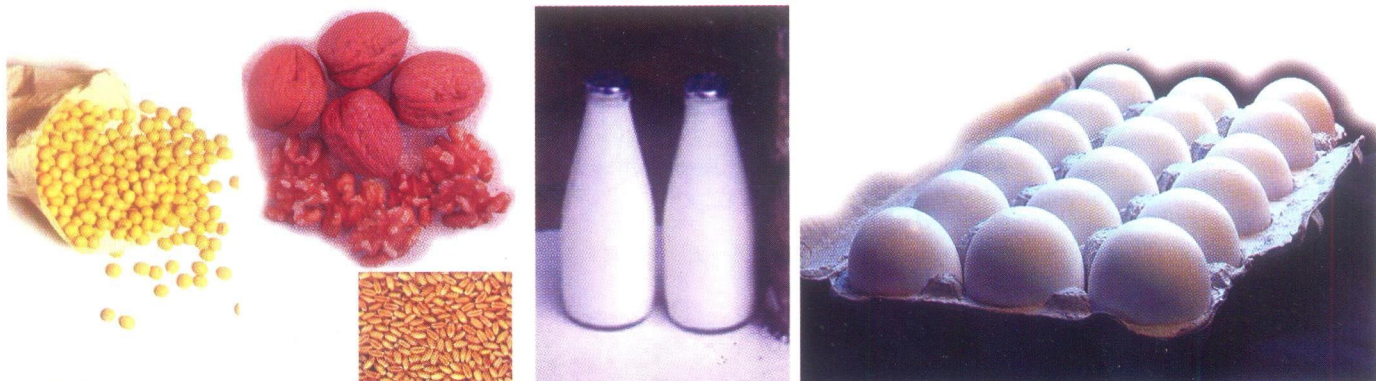
With a risk of 1 in 14, prostate cancer is the most commonly diagnosed male cancer. Prostate cancer develops from cells within the prostate gland, and is a relatively slow developing cancer which means that symptoms may not show until the disease is in its advanced state. If we look at diet in conjunction with cancer of the prostate, saturated fat is the big evil. Red meat, such as beef, lamb and pork are thought to increase the risk of prostate cancer as they contain a lot of fat. Further, dairy produce is also linked to prostate cancer because of its saturated fat content.

Cases of prostate cancer are more common in westernized countries where saturated fat is more prevalent in day-to-day diet. Incidences of prostate cancer also rose within eastern countries as they started to become more 'westernized'.

### Allergy

Food allergies occur when the immune system overreacts to certain proteins in food. According to S. Allan Bock of the National Jewish Medical and Research Center in Denver, true food allergies affect as many as seven per cent of children and about two per cent of adults. Although more than 200 food ingredients can provoke an allergic reaction, the vast majority is caused by nuts (like walnuts and almonds), peanuts (they are legumes, not nuts), milk, eggs, fish, shellfish, soybeans, and wheat. Typical symptoms are nausea, hives, skin rash, nasal congestion, and wheezing. Seafood,





## Allergy Causing Foods

fish, etc. have also been associated with food allergies.

It has been observed that about 95% of the food allergies are linked with parvalbumin, a calcium-binding protein abundantly found in the muscle of fish, frog and other vertebrates. Two to seven parvalbumins have been detected in the fish muscle.

Most reactions to food are caused not by allergies but by intolerances, which are less severe (except for those caused by sulfites). Intolerances could be triggered by almost any food, which makes them harder to pin down. Sulfur-containing additives are used as preservatives in dried fruits, wines, and dehydrated potato products like mashed potato flakes. About one in every 100 people with asthma is sensitive to sulfites. If they eat a food that contains sulfites, their throats may constrict and cut off the flow of air. Sulfite sensitivity can develop at any age. People sensitive to sulfite should avoid foods that contain sulfur dioxide, sodium sulfite, sodium or potassium bisulfite, or sodium or potassium metabisulfite.

Some people react with itching or hives to a synthetic yellow food-coloring agent called tartrazine, or Yellow No. 5. Synthetic food colours can also provoke behavioural problems like irritability and restlessness in susceptible children.

*Synthetic colours are used to make pulses attractive but these colours may be harmful*

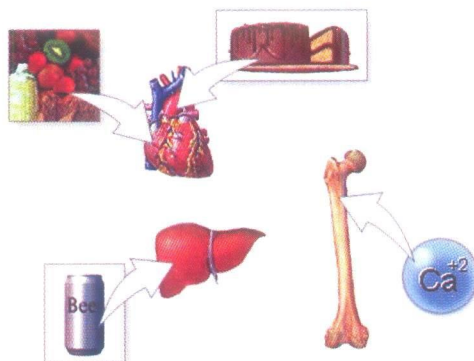


## *Diet has proven effects concerning prevention or contraction of various diseases*

Malachite green, a food colouring agent, is classified as a non-permitted chemical by WHO but it has been detected in commonly used food items in India. Malachite green is a powerful transforming agent and the subcutaneous injection of these transformed cells in nude mice results in tumour formation, says Dr K.V.K. Rao of the Cancer Research Institute, Tata Memorial Centre, Navi Mumbai. Moreover, Monosodium Glutamate (MSG) a flavour-enhancer has been blamed for Chinese Restaurant Syndrome; some people report headaches and flushing after eating Chinese food, which is often prepared using MSG.

### *Milk Intolerance*

Lactose is the most common intolerance. Some people don't produce enough of the enzyme lactase to digest all the lactose (milk sugar) they consume. When too much undigested lactose reaches the large intestine, it can cause gas or diarrhea. But people with lactose intolerance don't have to avoid all dairy products. Some like cheese, ice cream, and yogurt have much less lactose than milk. And most lactose-intolerant people don't even have to give up milk. However, studies by Michael Levitt, a



gastroenterologist at the V.A. Medical Center in Minneapolis showed that people who believe they are lactose intolerant can still consume the equivalent of a cup of milk in the morning and another one in the evening with little or no discomfort.

### *Kidney Stones*

Sometimes, it is advised to patients of kidney stones not to take calcium. In view of recent researches this might be bad advice. A study of 45,000 men conducted by the Harvard School of Public Health found that men who took diets rich in calcium had a one-third lower risk of developing kidney stones than those who consumed calcium sparingly. One possible reason is that calcium blocks the action of a chemical implicated in stone formation. Thus, a glass of milk a day may keep kidney stone away. Moreover, women are advised to take sufficient calcium rich diet during pregnancy and also throughout their life so as to counteract the calcium depletion due to osteoporosis.

### *Excess Carbohydrates*

Although carbohydrates are the body's main source of energy, excess may lead to health problems such as weight gain,



obesity, and diabetes. A study conducted by researchers of the Harvard School of Public Health and the Instituto Salud Publica in Cuernavaca, Mexico, suggest that a diet high in carbohydrates may heighten a woman's risk of developing breast cancer. Elevated insulin levels were noted in the blood that resulted in the start of a biological process, promoted cancer-causing cells to grow exponentially, elevating estrogen levels in the blood and encouraging cancer in pre-menopausal women.

Fructose and sucrose manifested the greatest relationship to breast cancer risks because they both cause a rapid increase in blood sugar levels producing cancer-causing effects. Fructose is a natural sugar that is found in fruit and honey. Sucrose, commonly known as table sugar, is used to sweeten food and beverages. Diets consisting of too much sugar provide only calories, whereas, diets containing complex carbohydrates such as fruits, vegetables, legumes and whole-grain products contain lots of vitamins, minerals and other nutrients and make the diet healthy. Therefore, it is wise to limit the intake of refined sugars in favour of more nutritious foods.

## Obesity

Obesity is also linked to an increased risk of breast cancer especially in pre-menopausal women who gain weight during young adulthood. Obese women are more likely to get breast cancer. 'Obese' means more than 40% overweight. It is best to maintain a healthy weight, limit red meats and choose foods from plant sources.

Experts and nutritionists are of the view that women who include fiber, grains, fruit and vegetables in their daily diets can reduce their breast cancer risks significantly. Research indicates that eating fiber helps to protect against a number of disorders of the digestive tract such as constipation, diverticular disease, haemorrhoids and possibly cancer of the large bowel. In addition, fiber-rich foods are ideal for weight control since they are filling but low in calories. Certain types of fiber in a meal slow down the uptake of sugars. Therefore, they play an important role in the prevention of diabetes and related diseases (obesity, cardiovascular diseases).

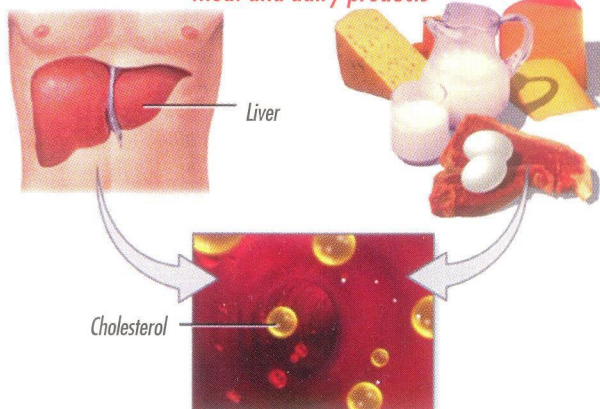
Low glycaemic index foods (low

## Fighting Cholesterol?

TOO much cholesterol circulating in your blood clogs and narrows your arteries, which can increase the risk of heart attacks and strokes. However, it's not all gloom and doom; you can lower your cholesterol by following some simple dietary rules:

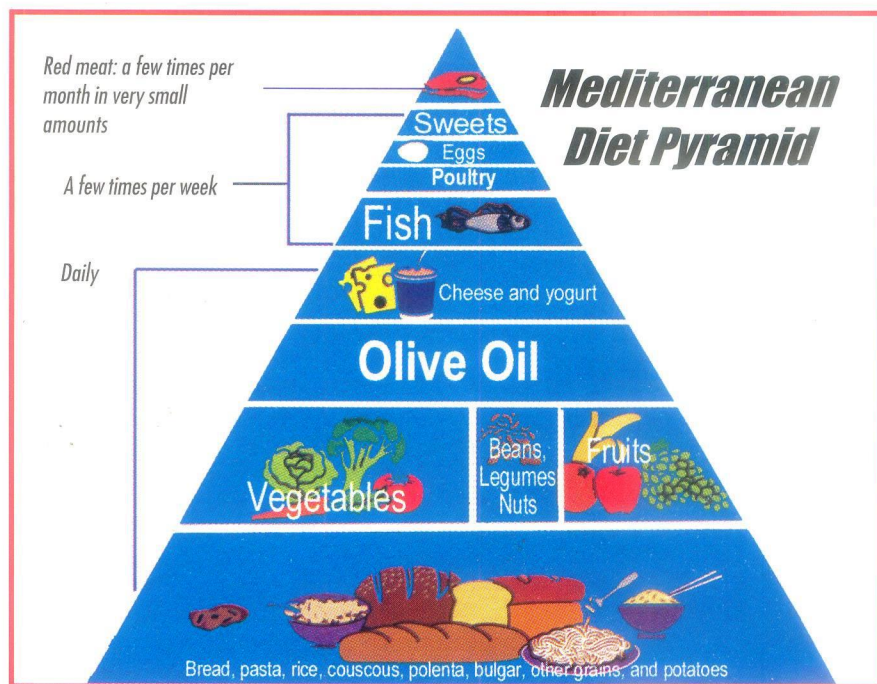
- Increase the amount of soluble fibre (brans and oats) in your diet.
- Reduce saturated fat in your diet, mainly found in beef, pork and lamb. Skin on poultry and fish also has a very high concentration of saturated fat.
- Eat more fruits and vegetables that contain essential nutrients.
- Add garlic in your meals.
- Use olive oil to cook. But remember, although olive oil is better for your heart rather than other cooking fats, it also contains as many calories.
- Increase the amount of Omega-3 in your diet by eating oily fish. Remember if they're tinned try to get them in brine, not oil.

*Cholesterol is produced by the liver and we consume it from meat and dairy products*



carbohydrates but high dietary fiber) are important in the management of diabetes. The presence of fiber in food reduces its energy density. A daily decrease in cholesterol would be

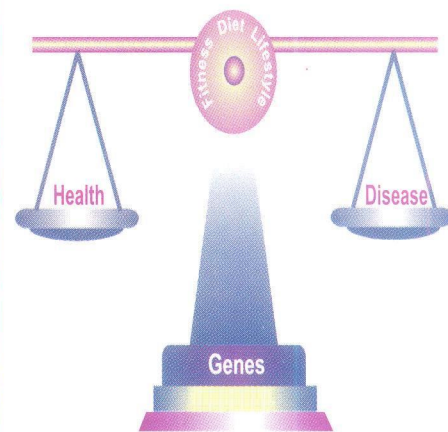
beneficial for health and especially against CVD (cardiovascular disease). In most European countries, the consumption of dietary fiber has been estimated to be around 20 g per day. An







*Wash all vegetables and fruits before use*



*Disease can be associated with genes*

increased daily intake, to approximately 30 g, is encouraged to promote health benefits associated with fiber.

## Carotenoids

The other important health promoting plant compound is carotenoid. It includes a large group of yellow, orange and red plant pigments. Foods that contain these pigments form a large part of the healthy Mediterranean diet. Along with vitamins E and C, carotenoids are antioxidants, and research demonstrates that an optimal intake of these important nutrients may help delay or prevent the onset of cancer, heart disease, cataracts and other major diseases. The most significant and common carotenoids are:

■ *Alpha-carotene*, low intake of alpha carotene rich vegetables is associated with higher incidence of lung cancer among smokers;

■ *Beta-carotene*, most effective at converting to vitamin A and has a potential role in anti-cancer mechanism;

■ *Cryptoxanthin*, very low levels of this carotenoid in blood may cause cervical cancer in women;

■ *Lycopene*, the most effective scavenger of single oxygen. High consumption of tomatoes and tomato products is thought to lower the risk of prostate, stomach and lung cancer;

■ *Lutein and Zeaxanthin*, linked with a lower risk of Age-related Macular Degeneration (AMD), which is a serious eye disease that can cause irreversible blindness.

Carotenoids are perhaps best known for their ability to be converted to vitamin A, which is essential for healthy vision and reproduction, and for maintaining body tissues. About 10% of carotenoids, including alpha carotene, beta-carotene and cryptoxanthin have such properties. As powerful antioxidants, they provide protection from dangerous molecules called free radicals which can be formed in body cells by the damaging effect of the sun, tobacco smoke, automobile exhaust and pesticides as well as the body's normal metabolic processes. However, it has been found that the most effective protection comes from mixed carotenoids, rather than large doses of single carotenoids.

## Phyto-oestrogens

Phyto-oestrogens are a kind of chemicals synthesized in plants. They are similar in structure to the female sex hormone, oestrogen. Some phyto-oestrogens are found in soybean products whereas others are found in the fibre of whole grains, fruit, vegetables and flax seed. Milk may also contain phyto-oestrogens, but this depends on what the cows have been eating.

Some early research has suggested that women whose diets are high in phyto-oestrogens have a lower risk of breast cancer. In some studies eating phyto-oestrogens (soya flour and linseed supplements) regularly over several weeks reduced oestrogen levels. Obese postmenopausal women could have higher oestrogen levels and so have a higher risk of breast cancer.

## Beverages

Beverages containing alcohol are known to increase the risk of some cancers. For instance, intake of strong alcohol is linked to the cancer of mouth, excess alcohol to bowel cancer. Moreover, some researches have shown that excess alcohol can increase the risk of breast cancer too. It may occur when it combines with other factors such as hormone replacement therapy. However, too much alcohol has so many other bad effects on our health and welfare that it is sensible not to drink.

*(Continued on page 34)*



# Stroke

**S**TROKE is the third leading cause of death after heart disease and cancer. Strokes also cause more serious long-term physical and mental disabilities than any other disease. A stroke occurs when blood flow to the brain is blocked by a clot. Brain cells are damaged or begin to die because they don't get the oxygen and nutrients they need. This causes a number of different effects, depending on the part of the brain affected and the amount of damage to brain. The brain stops sending signals to other parts of the body that control things like speaking, thinking, and walking.

Each year stroke occurs in 30.9 million individuals worldwide and is responsible for almost 4 million deaths. Any one can have a stroke, including babies and children, but around 90% of strokes occur in people over 55. The latest epidemiological reports confirm that there is a trend towards an increased incidence of stroke in the last decade. Stroke survivors often experience physical handicap, depression and cognitive dysfunction, which together affect their daily functioning, quality of life, and survival. Despite intensive research efforts, few effective treatments are available today.

## What Causes a Stroke?

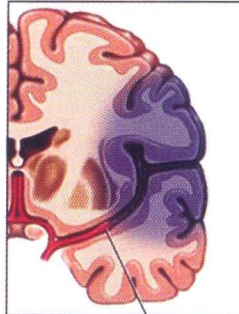
Depending on the manner in which it is caused, a stroke can broadly be said to be of two types—Ischemic stroke and Hemorrhagic stroke.

### Ischemic stroke:

Ischemic stroke happens when an artery leading to the brain becomes blocked by a blood clot (cerebral embolism) and circulation is obstructed. It is also caused when a plaque or other fatty deposits (cerebral thrombosis) block an artery, significantly reducing blood flow (for example, to less than one fourth of the normal flow level). The vast majority of strokes, approximately 80%, are Ischemic.

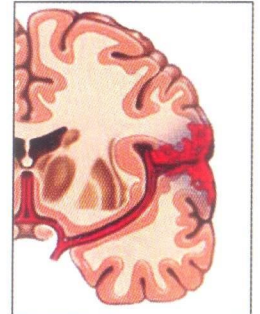
Ischemic strokes are either thrombotic or embolic, depending on where the obstruction or clot (thrombus or embolism) causing

### Ischemic stroke

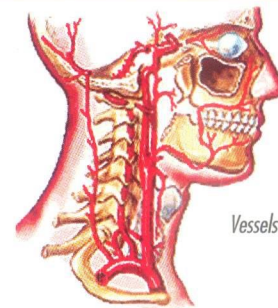


A clot blocks blood flow to an area of the brain

### Hemorrhagic stroke

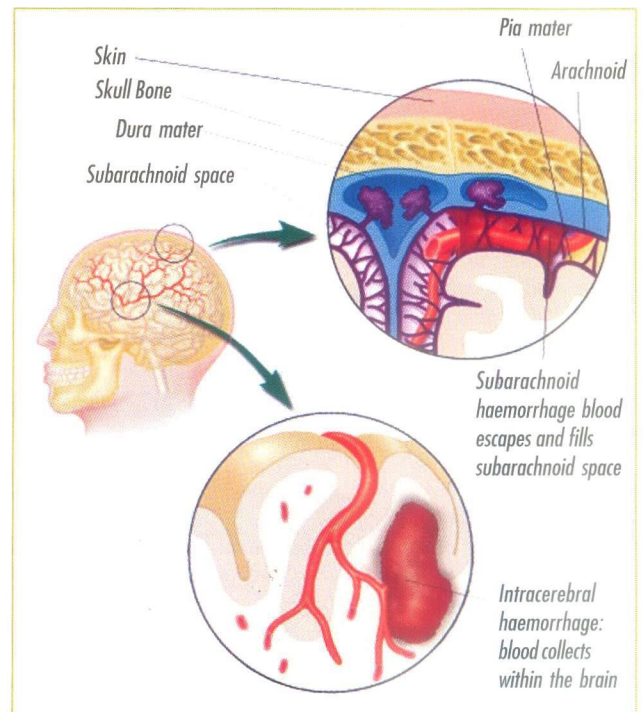
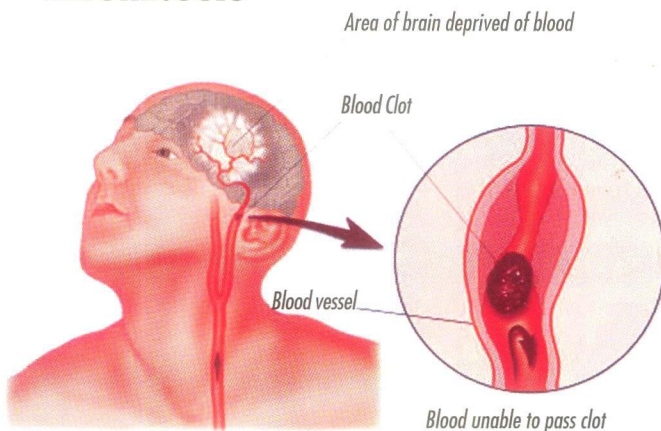


Bleeding occurs inside or around brain tissue



Vessels

## Thrombosis





# The Brain Attack

ANJANA MUNSHI,  
HUMERA & MUNAWAR

**Strokes are responsible for millions of deaths each year. It is important to be able to recognise the warning signs in order to get medical help as quickly as possible.**

the blockage originated. Thrombotic stroke is caused by a thrombus (blood clot) that develops in an artery supplying blood to the brain – usually because of a buildup of fatty deposits, calcium and clotting factors, such as fibrinogen and cholesterol, carried in the blood. The body perceives the buildup as an injury to the vessel wall and responds the way it would to a small wound – it forms blood clots. The blood clots get caught on the plaque on the vessel walls, eventually stopping blood flow.

A blood clot often forms in one area of the body and travels through the bloodstream to another where it may lodge causing what is called embolic ischemic stroke. In this case, the clot forms outside the brain—usually in the heart or large arteries of the upper chest and neck—and is transported through the blood stream to the brain. There it eventually reaches a blood vessel small enough to block its passage. Thrombotic disease accounts for about 60% of acute ischemic strokes.

The most common indicator is sudden weakness of the face, arm or leg, most often on one side of the body. Other warning signs may include sudden numbness of the face, arm or leg, especially on one side of the body; confusion, trouble in speaking or understanding, seeing in one or both eyes and walking, dizziness, loss of balance or coordination, and severe headache with no known cause.

The symptoms depend on the side of the brain affected, the part of the brain, and how severely the brain is injured. Stroke may be associated with a headache, or may be completely painless. Therefore, each person may have different warning signs.

**Hemorrhage stroke:** Hemorrhage stroke occurs when a vessel in the brain

suddenly ruptures and blood begins to leak directly into the brain tissue and/or into the clear cerebrospinal fluid that surrounds the brain and fills its central cavities (ventricles).

The force of high blood pressure can cause the rupture. It can also originate from a weak spot in a blood vessel wall (a cerebral aneurysm) or other blood vessel malformation in or around the brain.

Hemorrhagic strokes are differentiated by the location of the ruptured artery and where the resulting blood leakage occurs. The sudden rupture of an artery or blood vessel within the brain causes Intracerebral Hemorrhage (ICH) or intraparenchymal hemorrhage or intracranial hematoma stroke. Approximately 10% of all strokes are intracerebral hemorrhages. They occur most commonly in the basal ganglia where the vessels can be particularly delicate.

When bleeding from a damaged vessel causes blood to accumulate between the brain and the skull, in the subarachnoid space, and press on the surface of the brain instead of dispersing into the tissue, it is called subarachnoid hemorrhage. The leaked blood can irritate, damage or destroy surrounding brain cells.

Symptoms of a hemorrhage stroke appear without warning. The sudden increase in blood volume within the rigid skull (cranium) creates intense intracranial pressure that cannot be released. This in turn may trigger a severe (thunderclap) headache, neck pain, double vision, nausea or vomiting, loss of consciousness or even death.

About 17% of strokes are hemorrhagic. The average age at which people suffer hemorrhage stroke tends

to be lower than for ischemic stroke. The fatality rate for hemorrhagic strokes is higher than for ischemic strokes.

There is also one more type of stroke, which is caused by a brief pause in blood flow to parts of the brain – the result of which is temporary or partial blockage. Such type of stroke is known as TIA – Transient Acute Stroke or Mini stroke.

The symptoms of a TIA resemble those of a stroke but they do not last as long. Most of the symptoms disappear within an hour, although some may persist for up to 24 hours. Usually no permanent damage occurs as a result of TIA. The occurrence of it is a warning that the person is at risk for a more serious and debilitating stroke.

**While there are certain risk factors, it nonetheless can happen to anyone, regardless of age, race, socioeconomic status, or general health.**



## Factors Increasing the Risk of Stroke

■ Once someone has had a stroke, the person is more likely to have another stroke in the future too. Recurrent stroke is frequent; about 25% of people who recover from the first stroke will have another stroke within 5 years.

■ There are two types of risk factors – those you can't control and those you can.

### Factors you can't control:

■ **Age** - The older you are, higher the risk.

■ **Gender** - Males are at higher risk than females.

■ **Race** - Blacks, Hispanics/Latinos and Asians have higher risks than whites.

■ **Family history** of stroke and heart disease.

■ A prior stroke or TIA (transient ischemic attack).

### Factors you can control:

■ **Diet** - Eat a diet low in saturated fat, cholesterol and salt.

■ **Obesity** - The more overweight, higher the risk.

■ **High Blood Pressure** - Should be controlled and maintained at less than 140/90 mm Hg.

■ **Heart disease** - Atrial fibrillation (rapid, irregular heartbeat) should be treated.

■ **Carotid artery disease** - Can be treated by surgery, stenting, or medical therapy.

■ **Smoking** - Should be avoided.

■ **High cholesterol** - Should be lowered.

■ **Excess alcohol intake** - Should be avoided.

■ **Diabetes** - Increases the risk for stroke and should be controlled through diet, oral hypoglycemic drugs (drugs taken by mouth that lower blood sugar) or insulin.

## Diagnosis

One or more of the following tests may be required to accurately diagnose a stroke:

**Computed tomography (CT) brain scan** - This test involves taking a series of images of the brain to determine if bleeding may be a cause of the stroke. The brain tissue is also examined to see if irreversible brain damage has occurred. This test takes 15-20 minutes

## Genetics of Stroke

Studies involving twins, siblings and families have detected significant evidence of heritability indicating that genes are important but to date their identification is unclear. The causes are likely to involve many factors, some enhancing each other. Stroke risk is greater if parent, grandparent, sister or brother has had a stroke.

There is a slightly increased chance of having a stroke if members of your immediate family have had strokes. Some of the reasons why strokes run in families are understood and relate to high cholesterol and high blood pressure being in part inherited problems. We also tend to take on certain behavioral characteristics from our families (eating patterns, high alcohol consumption, and smoking). Hypertension in family history also increases the likelihood of stroke.

Stroke is thought to be promoted by several different genes acting in concert. Strk-1 gene was the first gene identified with ischaemic stroke. It is located on chromosome 5q12. This locus is distinct from those associated with diabetes mellitus, hypertension and hyper lipidemia and myocardial infarction. Strk-1 gene codes for protein that controls endothelial cell proliferation.

Phosphodiesterase 4D, or "dunce" gene, is highly associated with both the carotid artery and heart-associated forms of stroke. It is associated with the cell's internal signaling system and causes certain types of cells to be activated. These include the smooth muscle cells of the arteries. In patients with the variant form of the dunce gene the muscle cells of the artery walls may proliferate and form a plaque.

Mutations in the human Notch 3 gene on chromosome 19p13 contribute to an autosomal dominant form of stroke called cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy (CADASIL).

In addition to these, some other candidate genes associated with stroke are:

- Haemostatic genes - e.g. Factor V, Prothrombin.
- Genes controlling homocysteine metabolism (MTHFR).
- The angiotensin-converting enzyme gene (ACE).
- The endothelial nitric oxide synthases gene (eNOS).
- Apolipoprotein E (APOE).

with only a slight amount of X-ray exposure. It is non-invasive and does not hurt.

**Computed tomography angiogram (CTA)** - This test is done in the CT scanner. Intravenous contrast (dye) is given and pictures are taken of the major blood vessels in and around the brain. This test is used to detect large blood vessels that may be blocked.

**Magnetic resonance imaging (MRI)/Magnetic resonance angiography (MRA)** - This test uses the body's own magnetic properties to look at the brain tissue and the blood vessels. In some cases, an MRI can also be used to evaluate how much damage has already occurred to the brain tissue and brain function.

**Lumbar puncture (Spinal Tap)** - Involves placing a very small needle into the back and into the lumbar subarachnoid space and withdrawing a small amount of cerebrospinal fluid (CSF). It is the most accurate test to find out if a small amount of bleeding has occurred around the brain that may have resulted in a hemorrhagic stroke.

**Ultrasound or 'Doppler' scan** - Involves placing a small transducer probe over the neck or forehead. Ultrasound waves are then used to look at the blood flow in the neck and the larger blood vessels of the brain. It does not hurt, and it allows rapid evaluation of the relative amount of blood flowing to the brain.

## Treatment

Strokes can be treated. Ischemic stroke patients can be treated with a thrombolytic drug, also called a fibrinolytic or clot-buster. Tissue Plasminogen Activator (tPA) is a thrombolytic agent for treating acute ischemic stroke. tPA occurs naturally in the body – it's an enzyme made by cells in blood vessel walls. Stroke specialists use a genetically engineered version, which was first employed in the treatment of blood clots in the heart. Use of tPA offers a 30-50% better chance of cure from stroke disability. tPA must be administered intravenously within three hours of the onset of stroke symptoms – called the "GOLDEN



HOUR" of diagnosis. But it is not beneficial always. Patients taking blood thinners, with elevated blood pressure or blood sugar, recent surgery, low platelet count, and end-stage liver or kidney disorders cannot receive tPA.

Many patients arrive at the hospital too late to qualify for intervention with tPA, so the next alternative is mechanical clot busters. It is an endovascular procedure involving the use of a mechanical device on the end of a catheter to physically pull out all or part of a clot.

Since stroke is recurrent, to prevent the next stroke some drugs are administered. Administration of antiplatelet agents, such as aspirin, has shown better results in acute stroke and decreased the risk of stroke recurrence. Hypoglycemia (abnormally low levels of sugar in the blood) and hyperglycemia (excess levels of sugar in the blood) can aggravate stroke damage. So hypoglycemic patients often are given glucose, while hyperglycemic patients receive insulin.

Nimodipine (also called a calcium channel blocker) is another drug that can decrease the risk of the neurological damage that results from subarachnoid hemorrhage (bleeding between the brain and the skull). Nimodipine reduces the risk of cerebral vasospasm, a dangerous side effect of subarachnoid hemorrhage in which the blood vessels in the subarachnoid space constrict erratically, cutting off blood flow.

Treatment is also available for hemorrhagic strokes. An aneurysm, a weak bulging spot on the wall of a brain artery, is very much like a thin balloon or weak spot on an inner tube and should be treated as quickly as possible. In endovascular treatment, a long, thin, flexible tube (catheter) is inserted into a major artery, usually in the thigh, guiding it to the aneurysm or the defective blood vessel, and a tiny platinum coil (called stents) is inserted into the blood vessel through the catheter. Stents support the blood vessel to prevent further damage and additional strokes.

## Future of Stroke Treatment

New medications are also being tested that help slow the degeneration of the nerve cells that are deprived of oxygen during a stroke. These drugs are referred to as "neuroprotective" agents. Another example is chlormethiazole,

## Dealing With Strokes

The symptoms that follow a stroke depend on the area of the brain that has been affected and the amount of brain tissue damage. Some of the symptoms to look for are:

- A numb or weak feeling in the face, arm or leg.
- Trouble speaking or understanding.
- Unexplained dizziness.
- Blurred or poor vision in one or both eyes.
- Loss of balance or an unexplained fall.
- Weakness in the muscles of the face causing drooling.
- Difficulty in swallowing.
- Headache (usually severe or of abrupt onset) or unexplained change in the pattern of headaches.
- Confusion.
- Unconsciousness.

If any of these symptoms suddenly appear, emergency medical attention should be sought. The sooner treatment is started, the better. Here are few things to keep in mind:

- The first priority is calling for an ambulance. Also look around for a doctor nearby.
- The affected person should lie flat to promote an optimal blood flow to the brain.
- If the person feels drowsiness, unresponsiveness, or nausea, the person should lie on one side to prevent choking on his/her vomit.
- Although aspirin plays a major role in stroke prevention, once the symptoms of a stroke begin, it is generally recommended that additional aspirin not be taken until the patient receives medical attention. If stroke is of the bleeding type, aspirin could theoretically make matters worse.

which works by modifying the expression of genes within the brain. (Genes produce proteins that determine an individual's makeup.) Finally, stem cells, which have the potential to develop into a variety of different organs, are being used to try to replace brain cells damaged by a previous stroke. In many academic medical centers, some of these experimental agents may be offered in the setting of a clinical trial. While new therapies for the treatment of patients after a stroke are on the horizon, they are not yet perfect and may not restore complete function to a stroke victim.

## Stroke Rehabilitation

It has been seen that some brain cells may be only temporarily damaged, not killed, and may resume functioning. General recovery guidelines show that 10% of stroke survivors recover almost completely, 25% recover with minor impairments, 40% experience moderate to severe impairments requiring special care, 10% require care in a nursing home or other long-term care facility and almost 15% die shortly after the stroke. The goal in rehabilitation is to improve function so that the stroke survivor can become as independent as possible. This must be accomplished in a way that

preserves dignity and motivates the survivor to relearn basic skills that the stroke may have taken away, such as, skills like eating, dressing and walking.

The stroke patients face a number of problems after recovery. Depression is a common consequence and it is known to be associated with deterioration of quality of life, movement difficulties, shoulder pain, trouble in speaking and reading, expressing emotions, thinking or remembering, and swallowing. In serious cases the patients have no control over their bowel or bladder.

Stroke—like a bolt of lightning out of nowhere—can kill or severely disable those whom it strikes. Stroke is physically, mentally, emotionally, spiritually, socially, and economically debilitating. While there are certain risk factors, it nonetheless can happen to anyone, regardless of age, race, socioeconomic status, or general health.

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CHAKRAPANI PANDEY

# CHRONOTHERAPY

## TREATING WITH TIME

**Studies show that our body follows certain patterns and sequences as per our biological clocks. Chronotherapy aims to match the timing of treatment with the patient's timing of illness.**

**S**INCE the dawn of antiquity humans have always been conscious of their surroundings. They took cognizance of what is in their vicinity and what was happening around them. They observed nature taking everything into their thought process. And this was one of the primary reasons that humans have evolved into the beings that we are today.

Everyday our ancestors would observe that dawn was followed by dusk and likewise dusk was followed by dawn. This was among the first observed instances of sequential order in nature. Sequential order is the rule of nature and we are but a tiny part of nature.

Human studies elucidate that our body also follows certain patterns and sequences. The study of this pattern is known as Chronology. At a fixed time we sleep, we wake up, we feel hunger. Over the years, scientists and physiologists have been trying to unravel the mystery behind this most interesting phenomenon.

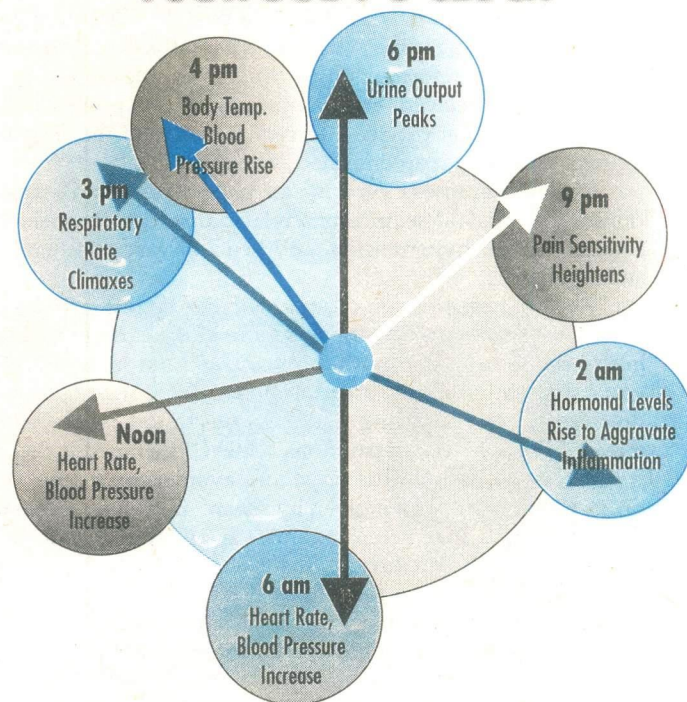
They found certain patterns in our body functions at a rhythmic basis. The earliest observed biological cycles were recorded by Alexander the Great's scribe, Androstenes in 4 B.C. In the late 1800 and early 1900 two doctors were instrumental in the study of biorhythm—Dr Hermann Swoboda, professor of psychology and Dr Wilhelm Fliess, an ENT surgeon from Berlin. They observed that people's emotion and physical stamina changed in a regular pattern.

The term "Chrono" basically refers to the observation that every metabolic event undergoes rhythmic changes in time. Researchers have deduced, that all living organisms are composites of rhythms and varying frequencies that may range from seconds to seasons. Perhaps the best-known and studied chronological frequency is the circadian rhythm,

which approximates the Earth's 24-hour rotation around the Sun.

Circadian rhythms are self-explanatory endogenous oscillations that occur with a periodicity of about 24 hours.

### YOUR BODY'S CLOCK







**Symptoms of nasal congestion and running nose are typically more severe in the early morning hours. If a dose of long-acting antihistaminics is given late in the evening or at night hours it is more effective.**

Normally circadian rhythms are synchronized to the internal biological clocks related to the sleep-wake cycle. Most people sleep at night and rise in the morning. In night-shift workers (who typically sleep during the day), the circadian rhythms are shifted to match their sleep-wake cycle.

Our biological clocks take their cue from the environment and the rhythms of the solar system that change night to day and lead one season into another. Our internal clocks are also dictated by our genetic makeup. These clocks influence how our bodies change throughout the day, affecting blood pressure, blood coagulation, blood flow, and other functions.

Scientists have recently concluded that both disease states and drug therapy are affected by a multitude of rhythmic changes that occur within the human body. Coordinating biological rhythms (chronobiology) with medical treatment is called chronotherapy. It considers a person's biological rhythms in determining the timing—and sometimes the amount—of medication to optimize a drug's desired effects and minimize the undesired ones. This is supposed to result in the maximum health benefit and minimum harm to the patient.

The goal of chronotherapy is to match the timing of treatment with the intrinsic timing of illness. Theoretically optimum therapy is more likely to result when the right amount of drug is delivered to the correct target organ at the most appropriate time. In contrast, many side effects can be minimized if a drug is not given when it is not needed.

Drug chronotherapy for the most part does not involve new medicines but using old ones differently. Revising the dosing schedule, reformulating a drug so its release into the bloodstream is delayed, or using programmable pumps that deliver medicine at precise intervals are some of the simple changes that may reap enormous benefits.

Chronotherapy is very useful particularly in allergic rhinitis, rheumatoid arthritis and related disorders, bronchial asthma, cancer, hypertension, and heart diseases (Ischemia and Infarction).

Asthma is a common disease with the largest circadian variation. The attack of asthma is more in the early morning hours. Therefore, chronotherapy for asthma is aimed at getting maximal effect from bronchodilator medications during the early morning hours. In the recent past, time-released Theophyllin preparations achieved therapeutic drug concentrations more in the night and avoided toxic level of drugs in the day hours, if given by 3 p.m. Likewise, another study revealed that Beta-2 agonists if given at 5 p.m. by inhalers or rotahaler devices, instead of at 8 a.m. were as effective as when given four times a day.

Similarly, chronobiological patterns have been observed with arthritis pain also. People with osteoarthritis, the most common form of the disease, tend to have less pain in the

morning and more at night whereas morning stiffness is characteristic of rheumatoid arthritis. Chronotherapy for all forms of arthritis uses standard treatment, nonsteroidal anti-inflammatory drugs and corticosteroids; however, the dosages are timed to ensure that the highest blood levels of the drug coincide with peak pain. The new Cox-2 inhibitors effectively relieve osteoarthritis symptoms when taken in the morning; and better results are obtained in rheumatoid arthritis when drug is given in the evening or night hours.

Symptoms of allergic rhinitis (nasal congestion and running nose) are typically more severe in the early morning hours. If a dose of long-acting antihistaminics is given late in the evening or night hours it is more effective.

Peptic ulcer is because of increased secretion of acid and maximal acid secretion occurs at night hours. Peptic ulcer pain, perforation of gastric and duodenal ulcers are more common at night. So, administration of H-2 antagonists or proton pump inhibitors given at bedtime is more effective.

In Hypercholesterolemia, higher rates of cholesterol intake and hepatic cholesterogenesis occurs during the evening hours, even in fasting states. Studies have shown that HMG-CO-A reductase inhibitors such as Atorvastatin or Rosuvastatin are more effective if given in late afternoon or evening.

Acute lymphoblastic leukemia is one of the first diseases studied that showed improved clinical outcomes with chemotherapy. The study found that the risk of relapse was 2.56 times higher in children who received chemotherapy in the morning than in those who received the same treatment in the evening. Many adverse cardiovascular events have been shown to display a highly significant circadian variation.

In another study, after studying 66,635 patients researchers found a 40% increase in the risk of myocardial infarction between 6 a.m. and noon and incidents of sudden death were generally reported during early morning. Another study revealed that strokes are 49% more likely to happen between 6 a.m. and noon. So drugs meant for decreasing cohesiveness and viscosity of blood should be given at night.

In cancer also animal studies suggest that chemotherapy may be more effective and less toxic if cancer drugs are administered at carefully selected times. The studies so far suggest that there may be different chronobiological cycles for normal cells and tumor cells. If this is true, the goal would be to time the administration of cancer drugs to the chronobiological cycles of tumor cells, making them more effective against the cancer and less toxic to normal tissues.

The recognition of circadian rhythms in both normal human biological functions and disease has heightened the awareness that the timing of drug regimens may have an important impact on effectiveness of treatment. However, chronotherapeutics present new challenges to regulators and scientists alike. Chronotherapeutic clinical studies need to consider additional parameters not usually required of other clinical trials. Among additional factors that must be considered are time of day a drug is administered; time-related biological factors, such as seasonal disorders (for example, seasonal affective disorder), and patients' normal routines (for example, eating times and sleep patterns).

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## CHILDHOOD OBESITY – ACT NOW OR REPENT LATER!

(Continued from page 13)

### Keep Fit

Often due to the pressure of studies, tuitions and coaching classes, little or practically no time is available for physical exercise. But then exercises keep you going for a longer time and also help you concentrate much better in your studies. Following tips will help you increase your activity in daily life.

1. Spare at least 30 minutes every day for some kind of physical activity like brisk walking, jogging or running.
2. Take stairs instead of elevators.
3. Go bicycling with your friends if you get bored alone.
4. Limit TV viewing and computer use to not more than two hours a day.
5. Help your mother in household activities like washing clothes, sweeping the floor, dusting, getting groceries from a nearby store, making the bed and keeping your room clean etc.
6. Play cricket, badminton and kho kho with your colony friends.
7. Take your dog for a walk.
8. During vacations, make the best use of available time. Nothing can be more enjoyable and stress relieving than a fun filled activity. Join dance classes, skating, judo and karate or learn swimming.
9. For short distances, go walking or take your bicycle.
10. Plan some outdoor activity with your family like going to an amusement park or playing games on the terrace.

### Losing Weight

Weight loss is not recommended for children and adolescents as they are in a growing stage. This emphasizes the need to have a well-balanced diet and an active lifestyle in order to be healthy.

Remember, there are no magic pills and capsules that can aid in weight loss. Also fad diets that overemphasize on one particular food group give

unrealistic promises. So say "no" to these fad diets and pills.

Dieting doesn't mean that you go on a hunger strike! Nobody can live without food, which is a basic requirement of all humans. Going on a diet will not help in the long run. Instead you may harm your body by depriving it of nutrition.

UNHEALTHY EATING HABITS	HEALTHY EATING HABITS
Irregular mealtimes	Eating at regular intervals
Nibbling in between meals	Having a balanced diet
Frequent consumption of refined foods	Eating a wide variety of foods
Low intake of fruits and vegetables	Eating lots of fruits and vegetables
Increased soft drink consumption	Drinking lots of water, fruit juices and buttermilk
Skipping meals	Having a good breakfast
Eating too much of fried and fatty foods	Eating slowly and chewing food properly

### Fat Track

- Body mass index (BMI) is a measure of body fat based on the height and weight of a person.
- A BMI between 18.5 and 24.9 is considered the normal range.
- Obesity can lead to depression and hypertension.
- A waist-to-hip ratio of 1 or higher in men and 0.8 or higher in women is indicative of upper body obesity.
- Obese patients between 20 and 40 years may experience a 12-fold reduction in life expectancy.
- Obese children and adolescents have shown an alarming increase in the incidence of type 2 diabetes, also known as adult-onset diabetes.
- Many obese children have high cholesterol and blood pressure levels, which are risk factors for heart disease.
- One of the most severe problems for obese children is sleep apnea (interrupted breathing while sleeping). In some cases this can lead to problems with learning and memory.
- Obese children have a high incidence of orthopedic problems, liver disease, and asthma.
- Overweight adolescents have a 70 % chance of becoming overweight or obese adults.

**Increased soft drink consumption not only provides empty calories but also puts an individual at risk of nutrient deficiencies.**

Always, remember the golden rules:

- Aim at behavioural changes, not weight loss.
- Stay focused on being healthy, not thin.
- Be active and have a well-balanced diet.

These small changes in your lifestyle can actually make a huge difference! This is not only useful for children and youth but also for adults whether overweight or normal. Remember, "Healthy eating and an active lifestyle should be a way of life rather than a therapeutic approach in the management and treatment of obesity."

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## YOUR FOOD COULD MAKE YOU SICK!

(Continued from page 23)

### Fatty Diets

Eating a very low fat diet is just as bad as eating a very high fat diet. Low fat diets contribute to moodiness and depression. Fat helps us feel full. A deficiency of Omega-3 fats (found in fatty fish and flaxseed oil) leads to higher risk of heart disease and arthritis. Whereas, a diet rich in monounsaturated fats cuts cholesterol and heart disease risk.

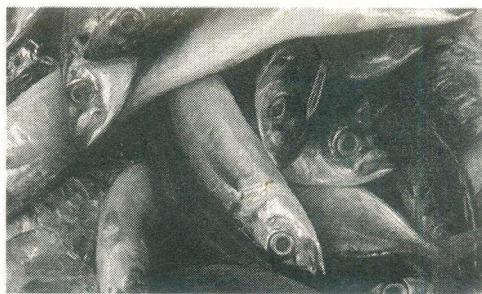
Trans fat is the worst of the fats. It raises LDL (low density lipoproteins), which is bad cholesterol, and lowers HDL (high density lipoproteins), which is good cholesterol. Trans fat is found in most margarines and fast foods. It is also found in many prepackaged, processed foods. You should try to avoid processed foods such as chips and crackers, fried foods especially those that have been deep-fried and baked in "partially hydrogenated vegetable oil".

Ironically, it's the processing of pure vegetable oils – a good source of heart-friendly unsaturates – that creates harmful trans fats. During manufacturing, these liquid oils have hydrogen bubbled through them in a process called hydrogenation to improve their texture, flavour and shelf life. The resulting product is a more solid fat, called hydrogenated fat or hydrogenated vegetable oil, which is mostly used as an ingredient in many processed foods. Therefore, trans fat should be kept to the smallest amount possible.

Similarly, saturated fat is also bad fat that raises both HDL and LDL. But our bodies do need saturated fat in small amounts. Saturated fat is found in whole milk, butter, cheese, ice cream, red meat, chocolate, and coconut products. Saturated fat should not be more than 10% of your diet.

Monounsaturated fat lowers LDL levels and raises HDL levels. It may also reduce the risk of several kinds of cancer. It is found in olives, canola oil, avocados, and nuts. Likewise, polyunsaturated fat also lowers LDL and raises HDL and is thus good for health. Omega-3 and Omega-6 are two essential fatty acids as our bodies cannot produce them and, therefore, they must be

Nutritious foods



obtained from dietary sources. Oily fish is a rich source of Omega-3 polyunsaturated fatty acids, which reduces the risks of heart disease. Polyunsaturated fat is found in corn, soybean, safflower, and cottonseed oil, as well as in fish.

It has been found that diets including beans might reduce the risk of heart disease and certain cancers. Interestingly, a European study on the Mediterranean diet provides new evidence that plant foods and unsaturated fats can help us live longer. A Mediterranean diet is characterized by a high intake of vegetables, fruits, cereals, and a low intake of meat and dairy products, with a high ratio of monounsaturated fatty acids (mostly olive oil) to polyunsaturated fatty acids.

According to recent medical reports, bladder cancer is the fourth most common cancer in men and the seventh most common cancer in women. A diet high in fruits and vegetables and low in fat will reduce the risk of bladder cancer. Therefore, by keeping a check on the intake of fat and taking a healthy diet one can help prevent or decrease the risk not only of cancer but also the risk of other diseases related to heart and diabetes. There is good evidence that a type of fibre called soluble fibre can help in lowering cholesterol. This type of fibre is found in oats, barley, pulses and some fruits.

Diabetes, which is associated with abnormal blood-fat levels, is also four times more likely in the Asian population, and is known to be linked to an increased risk of heart disease. Fish is the perfect health diet because of its low calories and saturated fat and is packed with versatile goodness of taste and texture. Therefore, we must include fish in our diet at least twice a week or more. Oily fish (Mackerel, Herring, and Sardines) contain Omega-3 fatty acids, which can help to reduce total blood cholesterol and also reduce the risk of heart disease and certain cancers.

**Well-balanced diet can reduce the likelihood of developing many health problems. Some researchers estimate that we could reduce the incidence of certain types of cancer by up to 33% if we ate more healthily.**

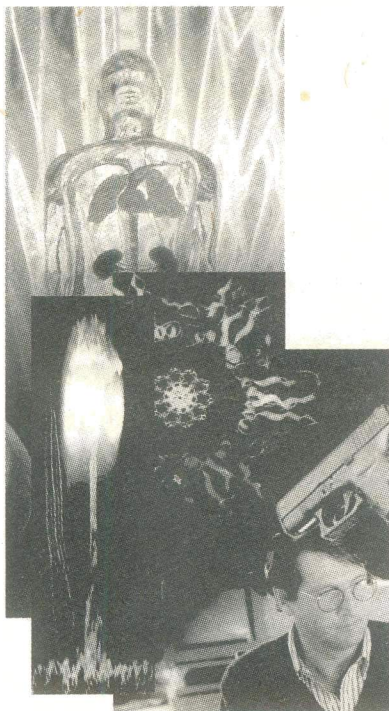
Fish is a good source of vitamins and proteins essential for healthy nerve tissues, strong bones and teeth and a glowing complexion. Seafood contains an abundance of essential minerals – iron, zinc, iodine and selenium. Omega-3 oils play an important role in the development of the child's brain during pregnancy and also reduces the chances of getting Alzheimer's, as this acid protects the brain against memory loss and cell damage that is caused by Alzheimer's.

Those who are vegetarian, or simply have an aversion to fish, must consume simpler Omega-3 fatty acids from plant sources which include green leafy vegetables (salad), nuts, seeds, oils of sunflower, soybean, and rapeseed, the most popular being Linseed/Flaxseed oil (which is one of the most concentrated plant sources of Omega-3).

Studies by nutritionists and scientists all over the world suggest that we may reduce the risk of getting many diseases simply by making healthy choices about the foods we eat and the beverages we drink. The choice of food can either assist treatment or work against it. Come close to nature and try to use natural food in its natural form.

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*Science Reporter* announces Science Fiction and Science Cartoon Competitions. We invite *original contributions* from our readers.

# Science Fiction and Cartoon Competition!

- You may take part in any of the two competitions or even both.
- In the *Science Cartoon* category not more than four cartoons may be sent per entrant. And remember, the cartoons should relate to scientific topics only.
- In the *Science Fiction* category readers are requested to send only one entry per entrant. The entries must be restricted to about 2000-2500 words.
- The winning entries will be published in ***Science Reporter*** and winners will be paid the requisite honorarium. There is no entry fee.
- The last date for receiving the entries is **15 March 2006**



## **Rush your entries to:**

Editor, *Science Reporter*

Science Fiction/Science Cartoon Competition

National Institute of Science Communication And Information Resources

Dr K S Krishnan Marg

New Delhi-110 012

Email: [sr@niscair.res.in](mailto:sr@niscair.res.in)



# Women in Science

On the occasion of International Women's Day (8 March)

**PRAVATI SAHU**

1. The name of the first test tube baby in India is:  
a) Laxmi                      b) Durga  
c) Parvati                    d) Radha
2. NASA astronaut Kalpana Chawla died in the year:  
a) 2001                      b) 2002  
c) 2003                      d) 2004
3. The book "Lilavati" was written approximately in the:  
a) Fourth century  
b) Eleventh century  
c) Sixteenth century  
d) Twentieth century
4. The curve "Witch of Agnes" is named after:  
a) Aganice                    b) Mary Anning  
c) Anna Atkins              d) Maria G. Agnesi
5. Florence Nightingale is famous also for her invention of:  
a) Stethoscope              b) Pie diagram  
c) Cartogram                d) Electrocardiogram
6. The first MBBS doctor of India is:  
a) Prasanti Gopal            b) Basanti Gopal  
c) Anandi Gopal            d) Sundari Gopal
7. From among the following women scientists, who got Nobel Prize twice?  
a) Emmy Noether            b) Gerty Cery  
c) Meitner                    d) Marie Curie
8. Who wrote the book "The connection of the physical sciences":  
a) Mary Somerville        b) Sabliere  
c) Mary Walker            d) Mary Weaver
9. Daughter of Marie Curie, Irene Curie got Nobel Prize in the year:  
a) 1933                      b) 1934  
c) 1935                      d) 1936
10. Shakuntala Devi is famous for her tremendous ability in:  
a) Physics                    b) Chemistry  
c) Mathematics            d) Medicine
11. Hypatia was a famous:  
a) Female mathematician  
b) Male mathematician  
c) Female geologist  
d) Male geologist
12. Caroline Herschel is supposed to be the first women to discover a:  
a) Planet                      b) Comet  
c) Satellite                    d) Star
13. "Stree Shakti Science Samman" for 2003 was awarded to Professor Sobhana Sharma for her contributions in the field of:  
a) Neurosciences            b) Biochemistry  
c) Physics                    d) Mathematical sciences
14. The first woman in space was:  
a) Valentina Tereshkova    b) Ellin Collins  
c) Sally K. Ride              d) Svetlana Savitskaya
15. The first woman to walk in space was:  
a) Alina Solovyova          b) Svetlana Savitskaya  
c) Ellin Collins              d) Valentina Tereshkova
16. The first woman to pilot a space shuttle was:  
a) Nokelai Sevastianov    b) Alina Solovyova  
c) Sally K. Ride              d) Ellin Collins
17. Miss Mitchell's comet named after Maria Mitchell was discovered in the year:  
a) 1846                      b) 1847  
c) 1848                      d) 1849
18. Who was the first computer programmer:  
a) Ada Byron                b) Edith Clarke  
c) Rosa Peter                d) Alice Burks
19. Name the woman marine geologist who in 1956 went to Antarctica:  
a) Caroline Mikelsen        b) Jennie Darlington  
c) Marie Klenova            d) Christine M. Schwarze
20. From among the following who is the first Indian doctor to be a member of the Antarctic expedition team:  
a) Kiran Bedi                b) Kamal Vilku  
c) Bachendri Pal            d) Bagheswari Qamar

## ANSWERS:

- |      |      |      |      |      |      |
|------|------|------|------|------|------|
| 1.b  | 2.c  | 3.b  | 4.d  | 5.b  | 6.c  |
| 7.d  | 8.a  | 9.c  | 10.c | 11.a | 12.b |
| 13.a | 14.a | 15.b | 16.d | 17.b | 18.a |
| 19.c | 20.b |      |      |      |      |

Contributed by Ms Pravati Sahu, Reader and Head, Department of Statistics, Khallikote Autonomous College, P.O. Berhampur, Dt Ganjam 760 001, Orissa





# WHEN WORK BEGETS PAIN

**Much of the pain and discomfort you experience could arise from a faulty body posture while at work or at home. Train your body to sniff the symptoms and adjust accordingly.**

**AMMAR IBNE ANWAR**

**H**OW often have you complained of a niggling backache, or a pain in the wrist or the elbow? It could all be work-related or the manner in which you carry yourself. Body posture while at work or while just moving around has a lot to do with the discomfort and fatigue most of us often complain about.

The study of the problems of people in adjusting to their environment; especially the science that seeks to adapt work or working conditions to suit the worker, is known as ergonomics. The word ergonomics comes from two Greek words: 'ergon' meaning 'work' and 'nomos' meaning 'laws'. Today, ergonomics commonly refers to designing work environments for maximizing safety and efficiency. Biometrics (the technique of studying physical characteristics of a person such as fingerprints, hand geometry, eye structure or voice pattern) and

anthropometrics (the technique that deals with the measurement of the size, weight, and proportions of the human body) play a key role in ergonomics.

Injury and illness are common in the workplace. When ergonomics is applied correctly in the work environment, discomfort and fatigue of the

eyes or muscles and bones are reduced significantly. Thus, it can increase the productivity and quality of work life.

In recent years,

**Take a periodic stretch break or workout on non-VDT job activities to prevent physical stress**

Anti-glare screen covers may help reduce eye strain and improve screen image.

Place terminal screen directly in front of operator. The viewing angle should be 15-35 degrees below eye.

Eye to screen distance should be 18-30 inches

Place screen and documents holder at the same viewing distance from the eye to avoid constant changes of focus.

Adjust VDT angle and/or light to reduce neck/eye strain. Adjust screen intensity for clear, sharp images.

Adjust keyboard height to allow upper arms to hang straight down from shoulders and forearms to be horizontal to the floor

For some, a footrest may reduce leg tension and provide contact with the floor.

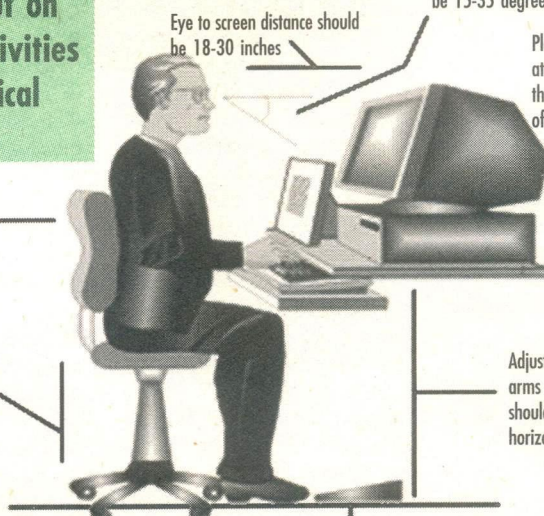
Adjust chair back height and tension for lumbar support.

Adjust chair height so that thighs rest horizontally, calves are positioned vertically and feet rest squarely on floor or footrest.

Use a chair with casters and a 5 point base to ease movement and minimize possible tipping.

Five point base

Adjustments of PC to avoid ergonomic problems





## Good Posture for a Smart You

Good posture involves training your body to stand, walk, sit and lie in positions where the least strain is placed on supporting muscles and ligaments during movement or weight-bearing activities. Proper posture:

- Keeps bones and joints in the correct alignment so that muscles are being used properly.
- Helps decrease the abnormal wearing of joint surfaces that could result in arthritis.
- Decreases the stress on the ligaments holding the joints of the spine together.
- Prevents the spine from becoming fixed in abnormal positions.
- Prevents fatigue because muscles are being used more efficiently, allowing the body to use less energy.
- Prevents strain or overuse problems.
- Prevents backache and muscular pain.
- Contributes to a good appearance.

Bad posture could be caused by several factors:

- obesity
- pregnancy
- weak muscles
- high-heeled shoes
- tight muscles; decreased flexibility
- poor work environment
- poor sitting and standing habits

### Correct standing position

1. Hold your head up straight with your chin in. Do not tilt your head forward, backward or sideways.
2. Make sure your earlobes are in line with the middle of your shoulders.
3. Keep your shoulder blades back.
4. Keep your chest forward.
5. Keep your knees straight.
6. Stretch the top of your head toward the ceiling.
7. Tuck your stomach in. Do not tilt your pelvis forward or backward.
8. The arches in your feet should be supported.
9. Avoid standing in the same

position for a long time.

10. If possible, adjust the height of the worktable to a comfortable level.

11. When standing, try to elevate one foot by resting it on a stool or box. After several minutes, switch your foot position.

12. While working in the kitchen, open the cabinet under the sink and rest one foot on the inside of the cabinet. Change feet every 5 to 15 minutes.

### Correct positions for stooping, squatting and kneeling

Decide which position to use. Kneel when you have to go down as far as a squat but need to stay that way for a while. For each of these positions, face the object, keep your feet apart, tighten your stomach muscles and lower yourself using your legs.

### Correct sitting position



1. Sit up with your back straight and your shoulders back. Your buttocks should touch the back of your chair.

2. All three normal back curves should be present while sitting. A small, rolled-up towel or a lumbar roll can be used to help you maintain the normal curves in your back. To find a good sitting position when you're not using a back support or lumbar roll:

- Sit at the end of your chair and slouch completely.
  - Draw yourself up and accentuate the curve of your back as far as possible. Hold for a few seconds.
  - Release the position slightly (about 10 degrees). This is a good sitting posture.
3. Distribute your body weight evenly on both hips.
  4. Bend your knees at a right angle. Keep your knees even with or slightly higher than your hips. (use a foot rest or stool if necessary). Your legs should not be crossed.
  5. Keep your feet flat on the floor.
  6. Try to avoid sitting in the same position for more than 30 minutes.

7. At work, adjust your chair height and workstation so you can sit up close to your work and tilt it up at you. Rest your elbows and arms on your chair or desk, keeping your shoulders relaxed.

8. When sitting in a chair that rolls and pivots, don't twist at the waist while sitting. Instead, turn your whole body.

9. When standing up from the sitting position, move to the front of the seat of your chair. Stand up by straightening your legs. Avoid bending forward at your waist. Immediately stretch your back by doing 10 standing backbends.

### Correct sitting position without lumbar support (left) and with lumbar support (right).

It is right to assume other sitting positions for short periods of time, but most of your sitting time should be spent as described above so there is minimal stress on your spine.

#### Correct driving position

■ Use a back support (lumbar roll) at the curve of your back. Your knees should be at the same level or higher than your hips.

■ Move the seat close to the steering wheel to support the curve of your back. The seat should be close enough to allow your knees to bend and your feet to reach the pedals.

#### Correct lifting position

■ If you must lift objects, do not try to lift objects that are awkward or are heavier than 30 pounds.

■ Before you lift a heavy object, make sure you have firm footing.

■ To pick up an object that is lower than the level of your waist, keep your back straight and bend at your knees and hips. Do not bend forward at the waist with your knees straight.

■ Stand with a wide stance close to the object you are trying to pick up and keep your feet firm on the ground. Tighten your stomach muscles and lift the object using your leg muscles. Straighten your knees in a steady motion. Don't jerk the object up to your body.

■ Stand completely upright without twisting. Always move your feet forward when lifting an object.

■ If you are lifting an object from a table, slide it to the edge to the table so that you can hold it close to your body. Bend your knees so that you are close to the object. Use your legs to lift the object and come to a standing position.

■ Avoid lifting heavy objects above waist level.

■ Hold packages close to your body with your arms bent. Keep your stomach muscles tight. Take small steps and go slowly.

■ To lower the object, place your feet as you did to lift, tighten stomach muscles and bend your hips and knees.

### Best position for sleeping and lying down

No matter what position you lie in, the pillow should be under your head, but not your shoulders, and should be a thickness that allows your head to be in a normal position.

■ Try to sleep in a position that helps you maintain the curve in your back (such as on your back with a pillow under your knees or a lumbar roll under your lower back; or on your side with your knees slightly bent).

■ Do not sleep on your side with your knees drawn up to your chest. You may want to avoid sleeping on your stomach, especially on a saggy mattress, since this can cause back strain and can be uncomfortable for your neck.

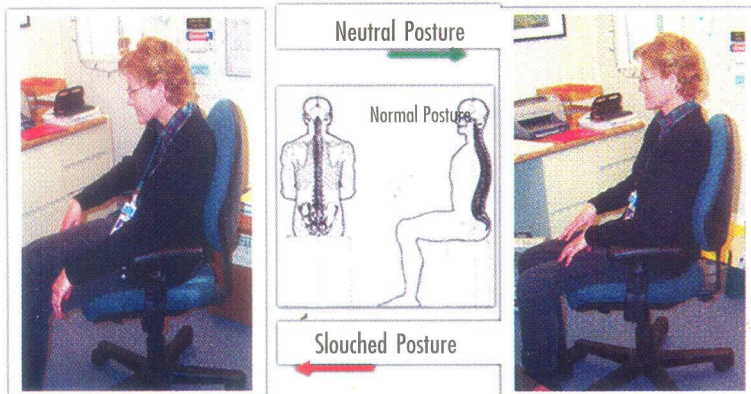
■ Select a firm mattress and box spring set that does not sag. If necessary, place a board under your mattress. You can also place the mattress on the floor temporarily if necessary. If you've always slept on a soft surface, it may be more painful to change to a hard surface. Try to do what's most comfortable for you.

■ Try using a back support (lumbar support) at night to make you more comfortable. A rolled sheet or towel tied around your waist may be helpful.

■ When standing up from the lying position, turn on your side, draw up both knees and swing your legs on the side of the bed. Sit up by pushing yourself up with your hands. Avoid bending forward at your waist.

(Excerpted from clevelandclinic.org)





**It is always better to train your body to handle discomfort. It is important to listen to the signals your body gives you.**

**Body posture while at work or while just moving around has a lot to do with the discomfort and fatigue most of us often complain about.**

**Sooner or later, you would be confronted with a choice between standing or sitting in a less than desirable chair.**

repetitive motion injuries have been identified as a factor in employee injuries. These injuries are caused by excessive and repeated physical stress on the musculoskeletal system—the hands, wrists, elbow, shoulders, neck, and back. Both work-related and non-work related conditions can either individually, or by interacting with each other, give rise to musculoskeletal disorders (MSDs).

Research has shown that appropriate posture at your workstation can help prevent a variety of conditions such as back pain and Carpal Tunnel Syndrome. Carpal Tunnel Syndrome is the result of a pinched nerve in one or both of the wrists, which inhibits the brain's ability to send and receive messages to and from the muscles and other tissues of the hand and wrist. The condition is also known as Repetitive Strain Injury (RSI). In most cases Repetitive Strain Injury is brought on by a combination of bad ergonomics, poor posture, stress, repetitive motion or typing injury.

All of us could significantly reduce the risk of injury if we could adhere to the principles of ergonomics. We know about the desirability of good posture, flexibility, relaxation, and the absence of tension. Yet, despite the

considerable attention given to the externals, ergonomic chairs, stretching exercises, correct posture, stress management techniques, etc., we are still tense and uncomfortable, susceptible to stress, and often suffer aches and pains.

We are familiar with the weight, effort and discomfort of the 'contracting' tendency. In sitting, for example, we all know the daily yo-yo between slouching and 'sitting up straight'. The endless attempts to get the posture 'right' need to go on because they don't change the underlying conditions. Our co-ordination, that pattern of muscular pulls which is peculiarly ours, is in place whether slouching

or 'holding ourselves up', driving a car or driving a computer. It is what we use to support ourselves against the ever-present pull of gravity.

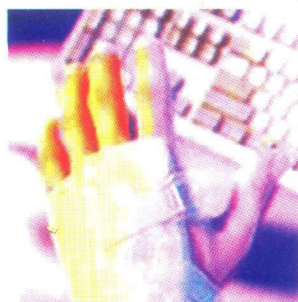
The spine is well sprung with resilient discs between the vertebrae. Otherwise, just one ordinary step would result in a minor concussion. The sacrum and coccyx cannot move but the 24 other vertebrae are connected by moveable joints. Together they make a very elastic construction. A wrong working posture, especially if you bend forward too much, will produce an uneven pressure on the discs. When the discs are 'squeezed' out of shape, the surrounding tissue will compress or

stretch. If the pressure becomes excessive, you may end up with a slipped disc. The outer ring of the disc will rupture so that the soft core will be squeezed out and press on the nerves.

While the etiologic mechanisms are poorly understood, there is increasing evidence that psychosocial factors related to the job and work environment play a role in the development of work-related musculoskeletal disorders (MSDs) of the upper extremity and back. Studies suggest that perceptions of intensified workload, monotonous work, limited job control, low job clarity, and low social support are associated with various work-related musculoskeletal disorders. It is also evident that these associations are not limited to particular types of jobs (e.g., video display terminal work) or work environments (e.g., offices) but, rather, seem to be found in a variety of work situations.

Ergonomics covers all aspects of a job, from the physical stresses it places on joints, muscles, nerves, tendons, bones and the like, to environmental factors which can effect hearing, vision, and general comfort and health. Physical stressors include repetitive motions such as those caused by typing or continual use of a

**Physical stressors include repetitive motions such as those caused by typing or continual use of a manual screwdriver.**



**In most cases Repetitive Strain Injury is brought on by a combination of bad ergonomics, poor posture, stress, repetitive motion or typing injury.**

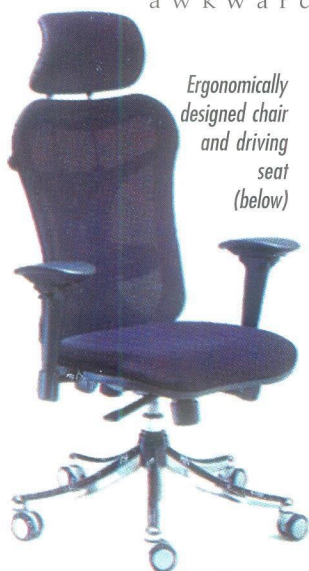


## Things to Know and Remember

- Prevention is the most important strategy for dealing with work-related musculoskeletal problems.
- Prevention begins with choosing an ergonomically sound work environment, good work practices, and employee awareness.
- To keep work-related symptoms from recurring, something in your work practices or environment must improve. If not, you won't get better.
- Each person has physical limits or a "comfort zone" of activities and work levels s/he can tolerate without developing lingering symptoms.
- You must cut back temporarily when symptoms occur.
- Your body doesn't know which are work activities and which are home or recreational activities—the two add up, and one is not necessarily worse than the other.
- Improper use or overuse of splints can cause symptoms that may be hard to distinguish from your original problem.
- To avoid work-related symptoms, stay in shape, get adequate rest at night, and take care of yourself.

manual screwdriver. Other physical stressors could be tasks involving vibration such as using a jackhammer, or tasks involving use of excessive force, such as lifting boxes of heavy books.

Working in an  
a w k w a r d



*Ergonomically  
designed chair  
and driving  
seat  
(below)*

position, such as holding a telephone to your ear with your shoulder, can also cause problems. Repetitive motions, vibration, excessive force, and awkward positions are frequently linked to ergonomic disorders; however, the majority of Cumulative Trauma Disorders (CTDs) or Repetitive Strain Injuries (RSIs) are caused by repetitive motions that would not result in undue stress or harm if only performed once. Carpal tunnel syndrome, Tendonitis (inflammation of the tendons), Tenosynovitis (inflammation of the synovial sheath), DeQuarvain's Syndrome, Thoracic Outlet Syndrome, many back injuries, and several other conditions may result from repetitive motions.

Environmental factors could include such things as indoor air quality or excessive noise. "Sick building syndrome", with its accompanying headaches, congestion, fatigue and even rashes, can result from poor air quality in a building or office. Excessive noise around heavy machinery or equipment can cause



**Learn to make adjustments. Raise or lower chairs to avoid typing with your wrists at an odd angle. Adjust computer monitors to avoid glare.**

permanent hearing loss. Improper lighting can cause eyestrain and headaches. In reducing your quality of life, they also reduce your ability to be efficient and productive.

Often when one complains of backache at work, one is given very expensive, ergonomically designed chairs. Soon they discover that these chairs are actually no better than ordinary ones. Others complain about their car seats, or about the curved plastic chairs often found in waiting rooms and in many airport lounges. It is certainly true that some chairs are a lot more comfortable than others, and that some chairs make it easier to have a healthier upright posture. But even if you could find the "perfect chair", you could hardly carry it around with you all day long. Sooner or later, you would be confronted with a choice between standing or sitting in a less than desirable chair.

Therefore, it is always better to train your body to handle such discomfort. It is important to listen to the signals your body gives you. If you suffer pain in the wrists or hands after a long day of

typing, examine your work area and work practices to see if they may be causing the problems. Learn to make adjustments. Raise or lower chairs to avoid typing with your wrists at an odd angle. Adjust computer monitors to avoid glare. Take frequent breaks from repetitive tasks to give your body a rest. Always use proper lifting techniques. Sometimes small modifications to work procedures, posture, habits, and/or work station design can make a big difference in the way you feel at the end of a day.

In order to keep fit, a person would have to be an observer of his/her own joint and muscle functioning and would have to be able to change the posture to a healthier one at will. Setting up your workstation properly and educating the people on posture and how to maintain it to remain comfortable may be the easiest way to prevent injuries.

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# Heart: The Pump of Life

## All about the Heart

The heart lies near the middle of the chest cavity, closer to the front of the chest than to the back. The lower part of the heart points towards the left side of the body. In newborn babies the heart weighs about 19 grams, and in adults, between 255-312 grams. A newborn baby's heart beats about 120 times per minute. The typical rate for adults is 72 beats per minute. But resting rates 60-100 beats (40-60 for athletes) are considered "normal."

## Anatomy Express

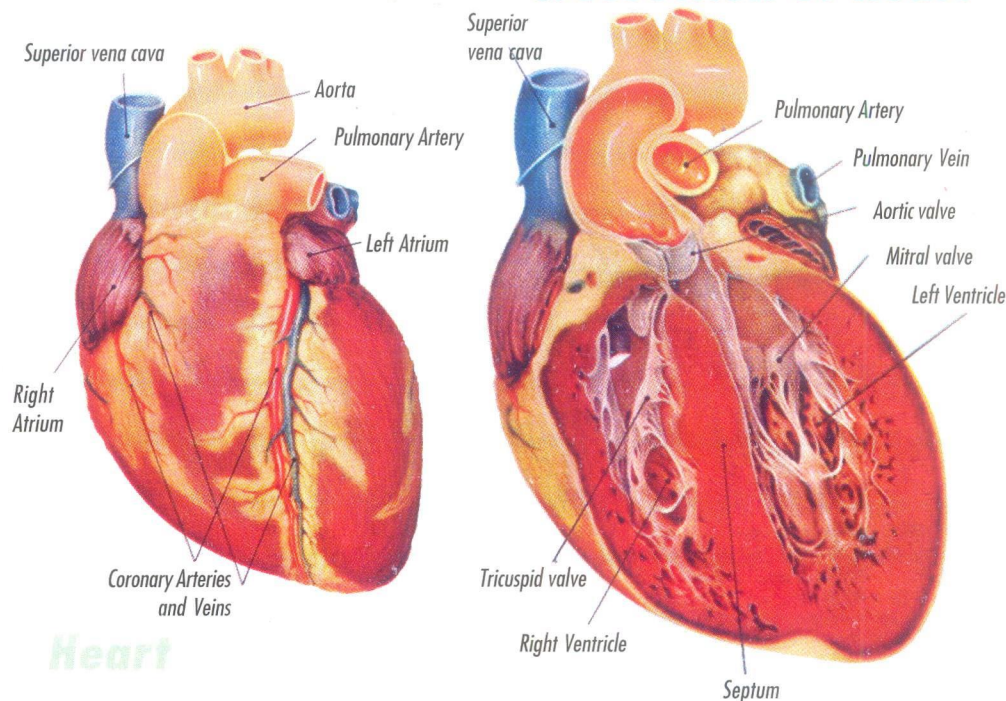
The heart is a hollow muscular organ. Heart muscle is called the myocardium or cardiac muscle. It is a special kind of muscle and shares aspects of the two other types of muscles found in the body. Heart muscle has striations like skeletal muscles but it works automatically like smooth muscles do. A delicate membrane called the epicardium covers the heart on the outside. The pericardium surrounds the epicardium. A slippery fluid between the epicardium and the pericardium enables the heart to contract smoothly.

The septum divides the heart lengthwise and the valves divide it crosswise. So, each side of the heart has two chambers, one above the other. The top chambers are called the right atrium and the left atrium. The lower chambers are the right ventricle and the left ventricle. The ventricles constitute the largest part of the heart—the entire lower portion. The delicate membrane called endocardium lines each chamber.

Two valves separate the atria and the ventricles. These are the atrio-ventricular valves called AV, for short. The AV valve between the right atrium and the right ventricle is called the tri-

The heart occupies a central position, not just in the chest cavity but in our daily conversations too. A hearty laugh. Have a heart. Lost my heart. From the heart. All heart. Cross my heart. Heart and soul. Heavy heart. Brave heart. Heartless—are all commonly used phrases that evoke the heart, which in the final analysis is little more than a muscular pump.

## Cross-section of Heart



cuspid valve because it has three flaps. The AV valve on the left side of the heart is called the mitral valve. Semilunar valve is present between each ventricle and its blood vessels (pulmonary artery and aorta).

## Tireless Pump

The heart is fully developed at about eight weeks of human gestation but begins to beat even earlier—at after four weeks of conception. At that point of time the heart is just a simple tube. But once the pulsations start, never do they stop in life. For a heart that is not beating is a heart that is dead.

The tireless heart pumps the body's entire blood supply (about 4.7 litres) through the body, every minute. In an hour the heart performs enough work

to lift 1,4000 kgs about 30 cm off the ground. Think of it as the equivalent of lifting a small car about one foot in the air! In one day, the heart pumps nearly 7,600 litres of blood. In a seventy year old person the heart would have beat two and a half billion times.

## In a Heartbeat

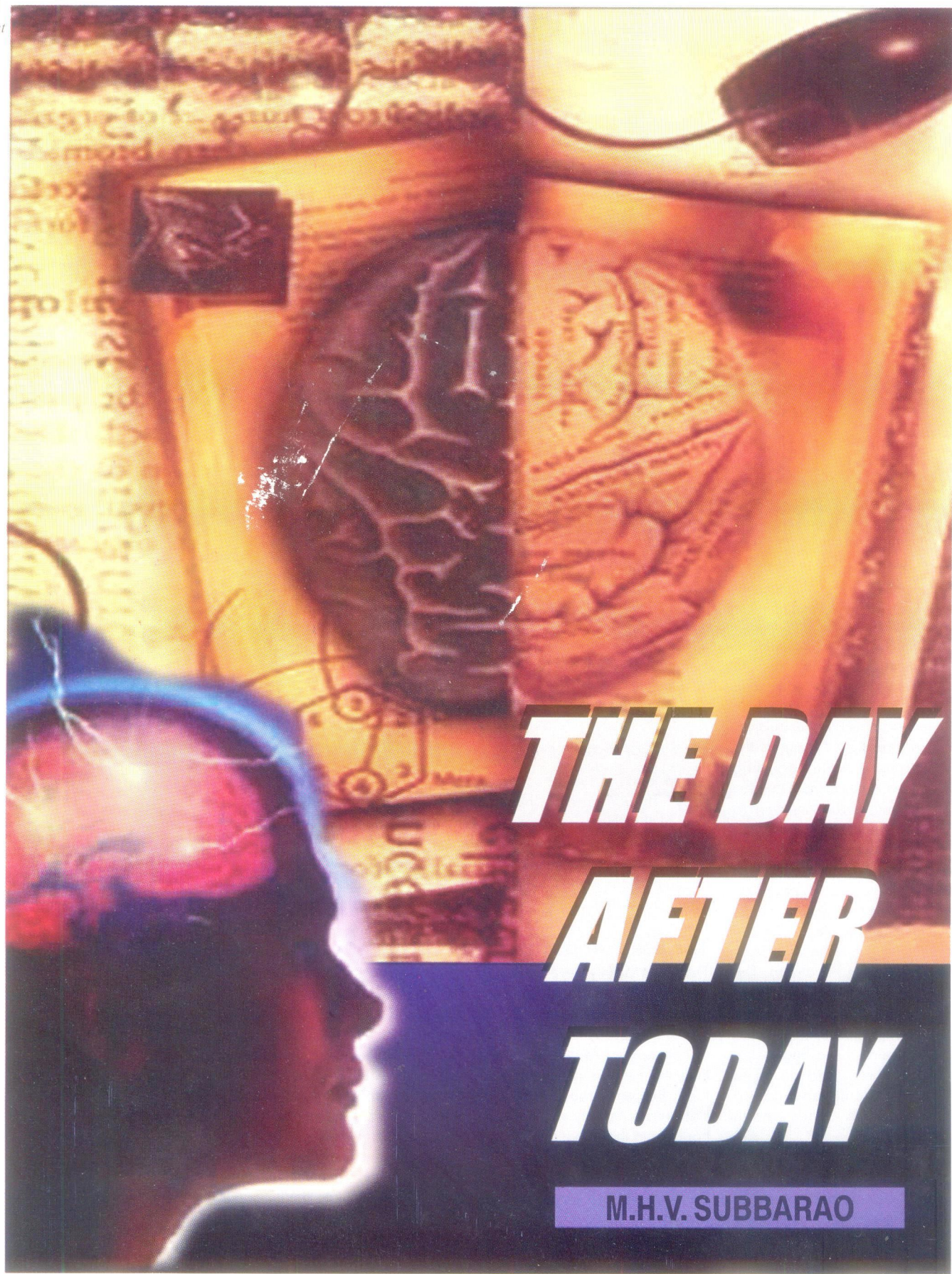
Blood that needs to be oxygenated enters the right atrium through the superior vena cava and inferior vena cava. Once the atrium is filled with blood, it contracts. The blood is forced into the right ventricle. The ventricle contracts and blood flows through the pulmonary artery into the lungs where oxygenation takes place. The oxygenated blood flows into the left atrium, which then

contracts to force the blood past the mitral valve to fill the left ventricle. Once the left ventricle is filled with blood, the mitral valve closes. The aortic valve now opens and the oxygenated blood rushes into the aorta and via the arteries to every part of the body.

Both sides of the heart pump blood simultaneously. The pumping activity is expressed as two periods: systole and diastole. Systole occurs when the ventricles contract, and diastole occurs when they relax. One complete contraction and relaxation of the heart muscle makes up one heartbeat. Closing of the valves produces the "lub dub" sound of the heartbeat, which we can hear with a stethoscope.

Dr Sukanya Datta





# ***THE DAY AFTER TODAY***

**M.H.V. SUBBARAO**



**The moment he laid his hand on him, he felt a strong tremor of an electric shock and let him off with a loud cry. Afraid that his own cry might attract people, he walked away hurriedly.**

"Got it? Or you want me to repeat?" asked Dr Virinchi. Dr Virinchi was a computer scientist, ranked third in the world.

She did not stir. Sitting with her head propped against her bent knees, there was no dint of reaction in her.

"You may have to take an immediate decision now. Every second you lose takes away your chances of living with your husband," said Dr Shukra, pointing to her dead husband. Dr Shukra was a neurosurgeon ranked sixth in Asia.

Both of them – Dr Virinchi and Dr Shukra – ran a medical firm in U.S.A.

She raised her eyes and looked blank.

She was traveling, a while ago, with her husband in their car, which crashed into a bus. His skull was geometrically split into two segments, connected just a bit at the end. The brain flowed out. Heart and pulse stopped beating. Miraculously the lady was left totally unhurt.

Dr Virinchi looked at her.

"We have to start working right this moment. Luckily no bones of your husband's skull are broken. We can straightaway plant our computer in his skull and sew it up. You are lucky that our car stopped here and we have such a computer readily with us. In fact, we were going to the airport to catch our flight to Germany. We are carrying this computer to fit it into a Robot there. But, to plant a computer in a human brain and make it work is an idea we have been toying with since long. So, we are prepared to take a business risk and try it on your husband. Of course, if only you agree."

She continued with her silence.

Dr Virinchi went on, "Your husband's skin strangely remained unruptured. We can keep it live with our impulses. It continues to function as normally as it was before his death..."

"Provided, of course, I keep transfusing 'Cello-Plasma'

subcutaneously once in six months," interrupted Dr Shukra.

"Yes," agreed Dr Virinchi. "That is necessary to prevent skin decay.... Well, with the body so regenerated you can lead a near normal life with him. That is not all, he can even converse with you. You give us an audiocassette of his voice and we can programme and feed some prerecorded talk into his brain, our computer. Dr Shukra will ensure that all movable parts of his body that carry out external functions, such as the lips, eyes and eyelids, hands, legs, neck and genitals are activated to function at the commands of the computer which you alone will operate. The inner parts like stomach, liver, lungs etc., will be preserved, though they remain non-functional. It should be okay by you... and then...." Dr Virinchi suddenly broke off as he heard her sobbing loudly.

"Alright, we will drop the whole thing if it is not acceptable to you," he said.

"No, No, No," she said vehemently. "I am willing. You go ahead. Don't spare any expenses. What is all this money worth without him?" Another wave of sorrow overwhelmed her as she said this.

"Relax! Then, we take it that we have your permission for our project. We have to get into business fast. Nothing can be done after somatic death takes place."

She nodded silently.

"By the way, what is your husband's name?"

"Mrityunjayamurty"

"Fantastic coincidence. Your name?"

"Savitri."

"Oh! You love up to your name, indeed!" said Dr Virinchi.

\*\*\*\*\*

To Savitri's parents, all this looked bizarre. They consulted some *pandits*.

"What do the Shastra's say? How did they consider Mrityunjayamurty—

dead or alive? And do they approve of Savitri living with him as wife?"

Some *pandits* quoted some scriptures and proclaimed him as living, since he was both 'Drashta' and 'Bhokta'.

Some quoted some other scriptures and declared him as dead since his body did not perform the functions of 'Annamayakosha', the mortal body.

Savitri did not bother. She had the permission of the World Science Congress and her position was legally impeccable.

Some people complimented her. Some said it was a publicity stunt. But all feared her.

But then communication gradually waned out. She was left in an unbearable wilderness.

\*\*\*\*\*

At times, she used to get pensive. Why had she chosen such an unusual way of life?

There was nobody to console, except her husband. He was the only 'living' soul to share her joys or sorrows; with always the same cold touch of 98.4° F meticulously maintained.

She was slowly getting used to it.

When the dinner was ready, she would invite him 'Please Come!' and click a button.

'Coming!' would be the answer.

If she felt the food was well made on that day, she would ask him. 'How is it?' and press a button. He would respond saying 'Nice'.

When the food was junk, she would press another button and receive a reply, 'Horrid'.

When she felt like it, she kissed him on the lips and said 'I love you' and he would reply, 'I too'.

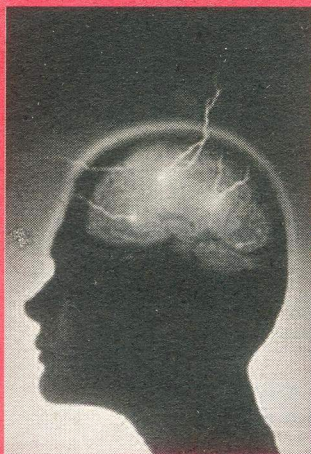
Yes, she was slowly getting used to this way of life.

\*\*\*\*\*

Madan was Savitri's next-door neighbour. He knew about the



**Day by day the grey matter went on getting piled up in fine layers. In three years, Mrityunjayamurty could manage his responses without electronic commands.**



happenings, and was sure that it was only a matter of time before he could lure Savitri to his bedroom. One day he ventured straight into her bedroom and caught her from behind.

She was nonplussed. She jerked him off, went to her husband, and hugged him in a reflex.

Madan laughed. He moved towards her and tried to push away Mrityunjayamurty. The moment he laid his hand on him, he felt a strong tremor of an electric shock and let him off with a loud cry. Afraid that his own cry might attract people, he walked away hurriedly.

For a moment, Savitri could not understand what happened. Madan's arrival was so unforeseen that she did not switch on the 'hands' of her husband. How did he react then?

She kissed him on his lips and felt as though his lips reciprocated!

She was scared; scared that a supernatural power, that she did not believe in so far, might not have possessed him.

That night she had a very disturbed sleep.

\*\*\*\*\*

Fortunately, the next day happened to be a day of routine check up by Dr Virinchi. Savitri narrated her apprehensions to him. He dismissed all that as her illusion.

But, on her insistence, he opened the skull and examined it. He was amazed to see some soft, greyish matter sticking to all the conductors in the circuit. He became curious. He scratched and collected some of it into a vial and tested it in the laboratory.

What he found was incredible and against any known law of science.

There were Brain Cells in that grey matter! That meant....! That meant....!! Oh...! Really???!!!

A nebulous clue flashed in his mind and he started working on it!

\*\*\*\*\*

He met Dr Sukra and together they developed graphic curves on the Doppler machine feeding all human instincts like love, anger, fear, hunger etc. He uploaded the information into the computer planted in Mrityunjayamurty's skull and started monitoring the results.

Day by day the grey matter went on getting piled up in fine layers. In three years, Mrityunjayamurty could manage his responses without electronic commands. He responded, of course, to only the most basic instincts. Subtle feelings had no place in his system.

At any rate, a dead man was brought back to life!

\*\*\*\*\*

Dr Virinchi and Dr Shukra shared the Nobel Prize that year. Savitri's name found place in the book of world records.

A meeting was held to felicitate Dr Virinchi and Dr Shukra. They were asked to speak on their unique achievement of re-creation of 'Man'.

Dr Shukra rose and began his speech:

"Ladies and Gentlemen! We can't thank Mrs Savitri enough for permitting us to experiment with the body of her husband. Let me illustrate briefly the principle behind this miracle. When we

charge a medium with electrical field and suddenly withdraw it, an infinitesimally small quantity of energy is left back in that medium. This happens due to the natural inertia of the medium-material. It is saved in the memory of that material. Such a memory accumulated over a period of time, is responsible for the reflex reaction in Mr Mrityunjayamurty.

I can see from your faces, that you are still not convinced of how the brain could be recreated. If I illustrate it with a simple example from our daily life, you may not believe me. You may think that I am fooling you.

How does a car start? When you turn on the ignition key, the self-motor starts and its motion is imparted to the wheels.

Well, you might have observed people pushing old cars on the road to make them start. How does a car start when you push? The motion of the wheels makes the self-motor turn and that motion is transmitted back to the wheels. The car moves. The same phenomenon is manifest here. The system accepted some of the unadulterated love Mrs Savitri showered on it as input, and stored a portion of it in its memory. This came out as output when Madan attacked his wife.

Once we were convinced that this was hypothetically possible, we sent in more and more of human emotions as input. This input in large doses has taken the shape of a 'Brain'. After all, what is brain? It is a complex conglomeration of emotions, past knowledge and feelings in material form.

The whole thing is as simple as that, and it is our good fortune that such a simple fact escaped the attention of eminent scientists all these years.

Let me tell you something. This is only the beginning. Mr Mrityunjayamurty's brain is now only a little better than that of a newborn infant. It is only Mrs Savitri who can make him a full-fledged man. Thank you all."

'Nisaapathi' M.H.V. Subbarao is Chief Engineer (Panchayatiraj) Rtd. Address: 101, Sri Venkateswara Paradise Apartments, HUDA Complex, Saroomagar, Hyderabad-35, A.P.



# "Genetically Modifying Humans Is A Great Idea"

## Leave It! We Are OK

Humans should be modified only after considering the fact that the modified form should be



kept under control and it would not disturb the balance in nature. Nevertheless, if modified,

humans are likely to become more aggressive and violent, thus disturbing the environment. **Arka Chakraborty**, Kharagpur, West Bengal

## Surviving Nuclear War

Genetic modifications if made cheap could be a boon for the survivors of nuclear war in the future. As a result, their offspring would not suffer from harmful effects of radiation. All nations



should encourage research in this field, as this could be the only possible help in case of nuclear war.

**Ankit Jain**, Meerut City

## Resisting Global Warming

Genetically modified person will lose his identity. But genetic modification will be helpful in medical treatment, as removal of harmful genes will become possible. It may also be helpful for humans to resist global warming, for instance, if a gene of thermophilic bacteria (growing in high temperature) is



transferred to human genome they can resist the high temperature of global warming.

**Abhishek Singh**, Balrampur (U.P.)

## Disruption of Nature's Law

There is no doubt that genetic modification of humans will play a very crucial role in making human life happy, prosperous and disease free. But in future, so many



problems will be created like enormous increase in world population due to decrease in human mortality rate.

**Prabhat Chandra Rastogi**, Jaunpur (U.P.)

## Treating Diseases

Yes! By genetic modification we can curtail the genes responsible for deadlier diseases, malpractices & complexities of human beings. Thus, we'll be able to end a lot of miseries and enjoy our beautiful planet a lot more.

**Pritam Chatterjee**, West Bengal



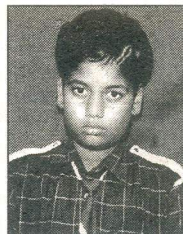
## Bad vs Good

We feel like modifying anything that we are not satisfied with. Just as a coin has two sides, genetically modified human beings will also have both good and bad sides. Genetically modified human being will help in obtaining desired characters and qualities in generations. In future, all the bad characters will be replaced by good characters. But it is time consuming and money consuming and also it is against nature's law.

**D. Aswani**, SRKP, Vizag (A.P.)

## Stop Tampering With Nature

Modifying the genes and producing a human being of desired features is a very costly and time-consuming affair. It is wise to divert that



amount and time to treat deadly diseases like AIDS, leprosy, SARS etc.

**A. Ajay**, SRKP, Vizag (A.P.)

## Violation of Natures' Law

By this process an exact replica of man can be produced. Imagine, what problems will be



created! It is more disadvantageous than advantageous.

**D. Sireesha**, SRKP, Vizag (A.P.)

## Wasteful Investment of Scientific Knowledge

Using this method, parents will get children with desired features and characters. But this will lead to spending of money and time. It is against

natures' laws and leads to exploitation. Instead of this, scientists need to solve some of the common problems in the world today like water crisis, cyclones, earthquakes etc.

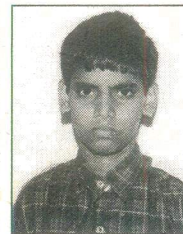
**P. Deepthi**, SRKP, Vizag (A.P.)



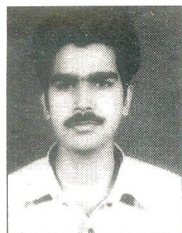
## Not Affordable

With this technology every parent could get intelligent, handsome, and sportive children. They can correct genetic disorders in children. But it will be against nature's laws and will create unhealthy competition. It costs crores of rupees and takes a lot of time. It is not affordable by the common man.

**D. Hemanth**, SRKP, Vizag (A.P.)







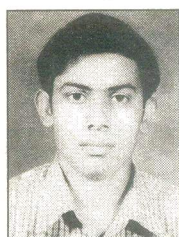
## Better, But Leads to Worse

Being the master of the biosphere, we have the responsibility to look after it. Genetically modifying and programming us according to the need will certainly look beneficial but it will destroy humanity and we will become mere machines.

**Ritesh Kr Tiwari**, Munirka, New Delhi

## Correcting Nature's Mistakes

It is a great idea because it can help in correcting nature's mistakes at the level of the hereditary unit—the DNA—and to improve the quality of organisms by implanting



desired genes. But it also has some demerits because genetic modification produces monsters, or sub-human creatures for specific purposes.

**Shoyan Mukherjee**, Sonitpur, Assam

## Indispensable Tool

The benefits of genetic modification of humans are immense. For example, Preimplantation Genetic Diagnosis (PGD) is becoming increasingly popular, because this procedure ensures a healthy pregnancy. Then, the utilization of the umbilical cord cells to save the sibling's life is an accepted practice. However, due caution should be exercised because of ethical reasons and lack of research on the success rate and potential risks.

**Dr Shiv Kumar**, Jaipur

## For Betterment

For the betterment and improvement of future generations it is necessary to increase the population of superior people. If this technique is used wisely, the human race could be improved which can definitely prove a boon for the welfare of mankind.

**Ravi Chaudhary**, Noida, U.P.

## It May be a Curse

Human being is the most advanced and highly evolved creature. They are enjoying



and living successfully in a delicate web of relationships. If they are modified the entire web will be destroyed and just like animals, there will not be any relation among them – no parents and no siblings.

**Syeda Maimona Hussain**, Hyderabad

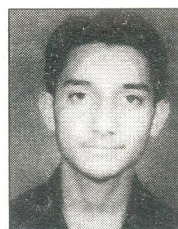
## Not a Great Idea

Genetic modification of human genes for health purposes is good but just to



change the physical characters may spoil the culture and tradition. The idea of modifying humans genetically is no doubt a great idea but its applications should be controlled ethically.

**Srikanth A.J.**, Bangalore



## For the Sake of Health

Genetically modified persons may be healthy in every aspect like mental, physical, and emotional. They will be more intelligent and they can contribute more toward the welfare of society.

**Anupam Sharma**, Dabrog, Himachal Pradesh

## Danger for the Society

Genetic modification is not a great idea. Genetically modified



people will be more intelligent as well as stronger physically and mentally. So, they will dominate the society. The ordinary people will feel inferiority complex and there will be conflict between the two, which will be a danger for society.

**Manum Sharma**, Mandi, Himachal Pradesh

## Criminals will be Benefited

Genetically modifying humans is certainly not a great idea. You can experiment it on one or two but not on every person. Also if a technique of genetic modification is available, then the criminals can commit crime and will never be caught. Therefore it should not cross the age of Experimentation.

**Sumit Gill**, Najibabad (U.P.)

## A Real Revolution

Genetically modifying humans is of course a great idea. This will lead to the birth of several Einsteins, which will revolutionize science and technology. Moreover, these guys would have no genetic disorder and will be more resistant to many diseases. So just go for it.

**Vivek**, Patna

## Is That Great Idea?

Of course it is a great idea to modify humans genetically. It may result in a future human race with high qualities, but it has a negative side. If started it will not have an end and this would surely lead to chaos in the human society. If genetic modification of humans is adopted, it will result in emergence of two classes of human race, modified enriched class of humans and normal old class of humans. This would surely have a negative impact on the human society. It should be encouraged only if it is useful in curing the dreadful inherited diseases in humans.

**Y. Sai Arpitha**, Eluru

## Solution to Problems

It is really a great idea because it solves a lot of our physical



problems. It will increase our mind power and work power. It will cure deficiency of vitamins, mineral, and other elements in the human body. For Indians, it is an excellent idea.

**Sony Singla**, Punjab





## Designer Babies

Scientists are already talking of designer babies. The marriage of cloning and in-vitro fertilization techniques makes it theoretically possible to genetically engineer the embryos. Genes that offer a benefit, say, added height or intelligence could be incorporated into embryos. Defective genes that trigger a disease or disability, such as cystic fibrosis or alcoholism, could be disarmed.

**Ankita Bali**, Ghaziabad

## Controlling Nature

By genetic modifications, we can have complete control over nature. We can reproduce our offspring according to our own will. There will be no diseased,



deformed, incapable and backwards. Everybody can be made a genius, beautiful, humble and well behaved.

We can create a philosopher, scientist, poet, writer, doctor, engineer, sportsman, film star and singers according to our own choice. However, there should be definite rules and regulations for genetic modifications, otherwise a great disaster will occur.

**Anshuman Satapathy**, Orissa



## Rich-Poor Divide

If the process of modification of genes is possible then the rich will be able to make their son or daughter great personalities like Einstein, Swami Vivekanand, Sania Mirza or Sachin Tendulkar. And the poor will have no place in society.

**Ammarsh Satapathy**, Orissa

## Magnificent Idea

Certainly, it is a great idea of modifying humans through genetics as it would control some disorders that prove fatal to humans.



**Zahoor Ahmad Dar**, Jammu & Kashmir

It is a sort of panacea and sign of relief for all those suffering from lethal genetic relating problems.

## Changing Fate

Yes, it can change even our fate. Hereditary diseases can be prevented. We can change the gender (male or female) and genetic problems can be solved. But it will not be accepted by religious heads.

**Seetha G.**, Chennai



## A Great Idea

Genetic modification in humans is a good idea because in coming future we have to tackle large problems, which a normal human being will not be able to face. Genetic capabilities will enable him to tackle the problems.

**Parv Sharma**, Jammu

## Both Merit and Demerit

Through genetic engineering humans of desired mental and physical ability can be developed. By removing the mental inequality and the factors responsible for antisocial actions, a classless and peaceful world society may be created. Humans of extraordinary mental ability can also be developed through genetics, who may begin a new era in different branches of science and philosophy by their thoughts, discoveries, and inventions. On the other hand, it will make life and nature meaningless.

**Ariz Zeebair**, Bihar

## Gene is the Main

Gene identifies the features of a person. The colour, height, likes & dislikes, and even the sex depend on genes. Through the process of genetic engineering,



one could change every thing of his life. If this process becomes possible, then it can create problem. It is anomalous to humans.

**Amaan Waheed**, Bihar

## Scientific Progress

Genetically modifying humans would bring a revolution in science as the then modified humans would be a thousand times superior to us. Since they would seldom commit mistakes, science would advance more rapidly. This one is indeed an invention most coveted.

**Mitali M. Damle**, Dombivli

## Future Diagnostics

Genetic modification will help us a lot in the diagnosis and treatment of many inborn diseases, which are due to gene abnormalities. Identification and



elimination of the deadly genes will help us to cure cancer.

**Vipin Kr Madheshiya**, Gorakhpur (U.P.)

**Now, write in your thoughts on this topic for inclusion in the forthcoming issues:**

**“While astronomy is based on scientific studies, astrology is a belief system.”**

*Be brief and be logical! Send in your photo, if you like.*



# Bioscience Quiz

Learn some exciting facts about  
Bioscience from this quiz.

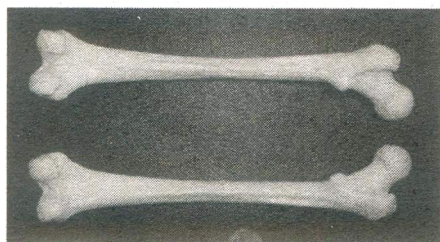
**RAKESH KUMAR DAS**

1. Which of the following is not a viral disease?

- a) Influenza
- b) Aids
- c) Leprosy
- d) Polio

2. Largest bone in human body is:

- a) Stapes
- b) Vertebrae
- c) Fibula
- d) Femur



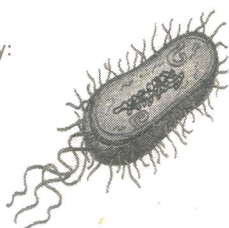
3. The father of modern cytology is:

- a) Dr. George Papanicolaou
- b) Robert Hooke
- c) Louis Pasteur
- d) Anton van Leeuwenhoek



4. The recycling of material is done by:

- a) Virus
- b) Bacteria
- c) Fungi
- d) Algae



5. Evolution is:

- a) Inheritance of genetic variation
- b) Continuous genetic variation
- c) Inheritance of acquired characters
- d) Inheritance of limiting factor

6. The scientific study of the structure and function of joints is called:

- a) Aretais
- b) Aphnology
- c) Apiology
- d) Arthology

7. Plants that catch insects for food are called:

- a) Herbivorous
- b) Carnivorous
- c) Grasshoppers
- d) Animal Plant



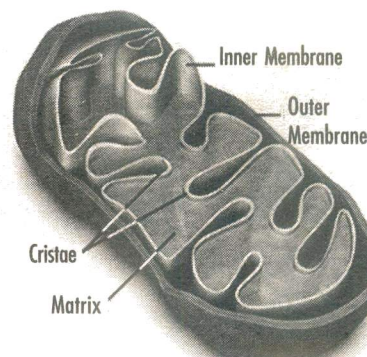
8. Uric acid is excreted in:

- a) Frog
- b) Man
- c) Rabbit
- d) Pigeon



9. The power house of the cell is:

- a) Chloroplast
- b) Golgi Body
- c) Mitochondria
- d) Nucleus

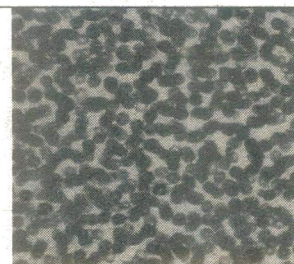


10. The most common colour blindness in which a person can not distinguish between the colours is:

- a) Yellow & White
- b) Red & Green
- c) Black & Yellow
- d) Green & Blue

11. Blood is a type of Tissue which is:

- a) Muscular
- b) Skeletal
- c) Connective
- d) Nervous





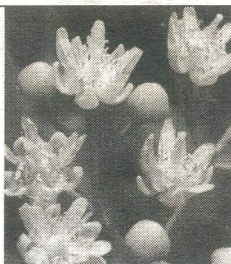
12. Rickets is caused due to deficiency of:

- a) Vitamin-A
- b) Vitamin-B
- c) Vitamin-C
- d) Vitamin-D



13. Flowering plants are called:

- a) Cryptogams
- b) Gymnosperm
- c) Angiosperm
- d) Flowroperm

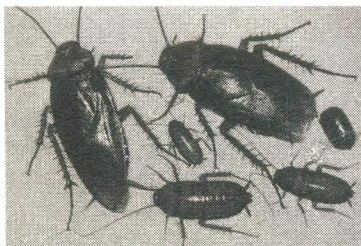


14. The blood group that is also called universal blood donor is:

- a) O
- b) A
- c) B
- d) AB

15. Which of the following has no blood but respire:

- a) Earthworm
- b) Hydra
- c) Fish
- d) Cocroach

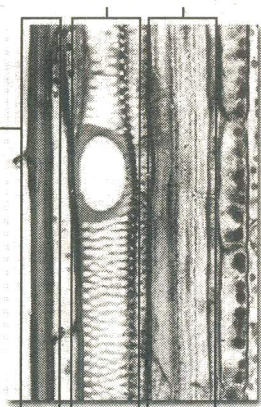


16. The "National Botanical Research Institute" is situated at:

- a) Delhi
- b) Mumbai
- c) Dehradun
- d) Lucknow

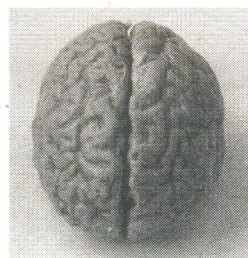
17. Which tissue helps in flow of water:

- a) Xylem
- b) Cambium
- c) Phloem
- d) Sieve Tube



18. The animal with the largest brain in proportion to its body size:

- a) Elephant
- b) Ant
- c) Human
- d) Snake



## ANSWERS:

1.c	2.d	3.a	4.b	5.b	6.d
7.b	8.d	9.c	10.b	11.c	12.d
13.c	14.a	15.d	16.d	17.a	18.c

Contributed by Shri Rakesh Kumar Das, S/o Ramesh Chandra Das, At-Townplanning Colony, Po/Dist-Dhenkanal (R.S.), Dhenkanal, Orissa-759013

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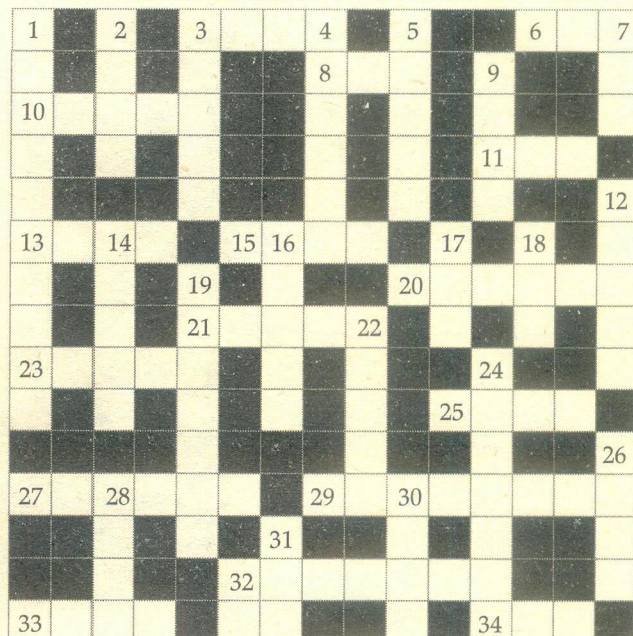


## ACROSS

3. The basic biological unit of heredity (4)
6. The field of force produced by electric charges and currents, which has both electric and magnetic components and also contains electromagnetic energy (3)
8. Pertaining to new (3)
10. Its botanical name is *Allium cepa* (5)
11. The rubber or cloth device used to catch the fish (3)
13. It is the soft, fleshy part of the fruit (4)
15. It is the everyday language of sodium chloride (4)
20. A deposit of lime or calcium carbonate produced by coelenterates (6)
21. The cone shaped light sensitive receptors of most vertebrate retinas which is responsible for daylight and colour vision (5)
23. It is the fat like substance and also one of the principal structure materials of living cells (5)
25. The circumferential edge of the apparent disc of the celestial body like Sun, Moon and Planet (4)
27. Infection caused due to harmful microorganisms (6)
29. A geological era commonly called as "age of reptiles" (8)
32. It belongs to molluscan species, commonly known as cuttle fish (5)
33. The part of the flower that is brightly coloured and conspicuous (5)
34. Any coloured substance that contain auxochromes and thus capable of colouring substances to which it is applied (3)

## DOWN

1. It is the genus of the small flies whose members are called fruit fly (10)
2. The angle between the stem and the leaf (4)
3. The category in scientific classification that ranks above species and below family (5)
4. The very hard and white substance that covering and protecting the dentin of teeth crown (6)
5. It is the rate of change of energy in a system (5)
7. It is the locomotory organ of the fish (3)
9. The perceived unit of loudness (4)
12. It is the fertile spot in the desert where water rises to ground level (5)
14. The transparent, usually slightly yellow, opalescent liquid found within the lymphatic vessels (5)
16. The cessation of breathing (5)
17. The process or state of decaying (3)
18. The short form of storage area network (3)
19. The periodic shedding of cuticle in insects (7)
22. Any of the special powers (sight, hearing, smell, taste, touch) by which living thing becomes aware of external world (5)
24. The internal organ of birds which has thick muscular walls and a tough lining and it crushes and grinds foods by muscular action (7)
26. A substance that dissociates to give hydrogen ions when dissolved in water (4)

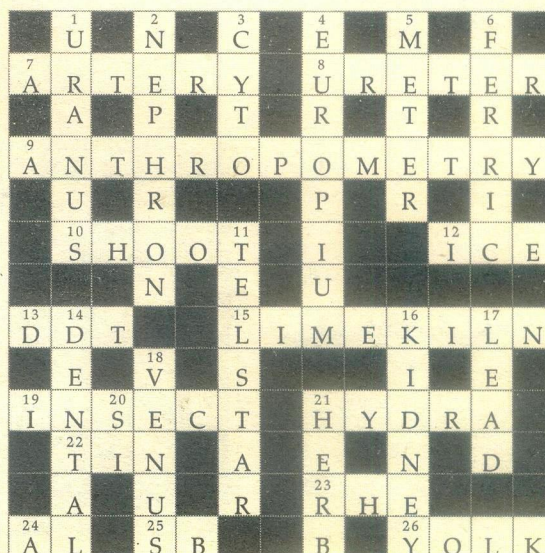


28. The partly decomposed vegetable matter formed in bogs and used as fertilizer and also as a fuel (4)
30. The mark left on the skin after the healing of a wound or burn (4)
31. An animal or bird kept for companionship or pleasure (3)

Contributed by Shruthi S.R., D/o B.S. Ravindranath, 280 Lakshmi Vilas Road, Mysore-24, Karnataka; Email: shrujain-24@yahoo.co.in

*Solution will be published in the next issue*

*Solution to Crossword February 2006 issue*







## Kirk's Dik-dik

Dik-diks can raise their body temperature without being threatened with death by heat stroke.

**They generally follow a hidden lifestyle under brush and shrubs. In order to warn females and young animals against enemies, the males whistle.**

WITH a maximum height of 45 cm and an average weight of 7.2 kg, these are the dwarfs among the antelopes. Very shy and elusive creatures, they mostly remain hidden behind the bushes and are known to form pairs for life.

A highly developed cooling system in their small nozzle, which is permeated with blood vessels, enables them to be active even in very hot temperatures. Their breathing increases to up to eight breaths per second and by this the blood in the nose cools off. This cold blood flows in special blood vessels toward their heart where hot blood, which flows up to the brain, is cooled in a kind of radiator system. Dik-diks therefore can raise their body temperature without being threatened with death by heat stroke.

Their food generally comprises green shoots, herbs and thick-leaved plants of the area.

The males have small horns of up to 10 cm length. After a gestation period of five and a half months a young is born which is kept hidden at first and visited by its mother to suckle until it is strong enough to follow her around. After one year the fawn is grown up.

The small dik-diks have many enemies, like leopards and other big cats, wild dogs and birds of prey. Therefore, they generally follow a hidden lifestyle under brush and shrubs. The animals are active by day and by night. In order to warn females and young



animals against enemies, the males whistle. All animals of the group hide upon this signal immediately. When startled dik-diks make quick zigzag leaps, dashing for cover while making a call that resembles "zik-zik" or "dik-dik", by which they get their name. Once the danger is over, all animals meet and sniff each other's head. After that they mark their territory together.

Dik-diks have a gland close to their eyes, the so-called pre-eye gland, the secretion of which is used to set marks on branches, grasses and stones. Every new, strong smell in the territory is immediately marked.

Another distinctive characteristic of dik-diks is that they deposit their fecal droppings in certain selected places, forming large piles of feces. Often they pile their droppings on top of elephant dung. This behaviour has led to a myth among the locals. It says that dik-diks pile their excrement balls on top of an elephant's heap, in order to become bigger than elephants one day.

**When startled dik-diks make quick zigzag leaps, dashing for cover while making a call that resembles "zik-zik" or "dik-dik", by which they get their name. Once the danger is over, all animals meet and sniff each other's head. After that they mark their territory together.**





# Presenting The Personal Computer

**The popular Personal Computer or PC is celebrating its 25<sup>th</sup> birthday this year. And what better time to look back and look ahead too?**

## 25 years of the PC

The PC revolution began in 1981, when IBM launched personal computers. Since then there has been no looking back for this handy machine that now has pride of place on most working desks around the world. The first computers that can be called 'personal' were the first non-mainframe computers, the LINC and the PDP-8. They were big (about the size of a refrigerator), expensive and had small magnetic core memories. These evolved to give rise to the "Mini" computers. The first generation of microcomputers appeared in the mid 1970s. These catered mostly to engineers and hobbyists, as they were often sold as kits to be assembled by the user.

## Home Computers

The home computer was the second generation of microcomputers. It entered the market in 1977 and was popular during the 1980s. These were mostly based on 8-bit microprocessor technology, typically the MOS Technology 6502 or the Zilog Z80. It cost less compared to earlier computers, thanks to mass production of the silicon chip based microprocessor. These computers were meant to be used in the home rather than for business.

Home computers displayed around 20–40 column text output on the television. Most such computers used ordinary compact audio cassettes as a storage mechanism since floppy disk drives were very expensive at the time. Families with school-going children bought such computers. But the IBM PC compatible personal computer hastened its demise.

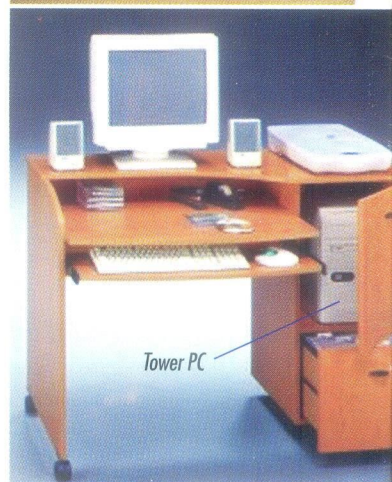
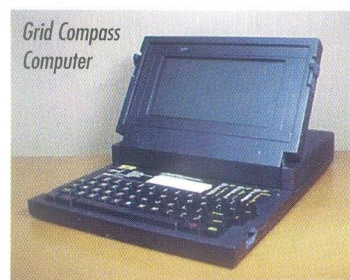
## Desktops

A desktop computer is a personal computer especially designed for use on a desk in an office or home. It is too large to

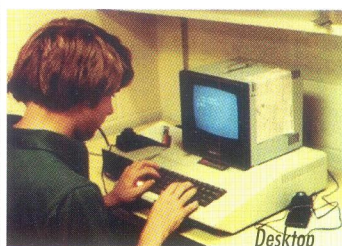
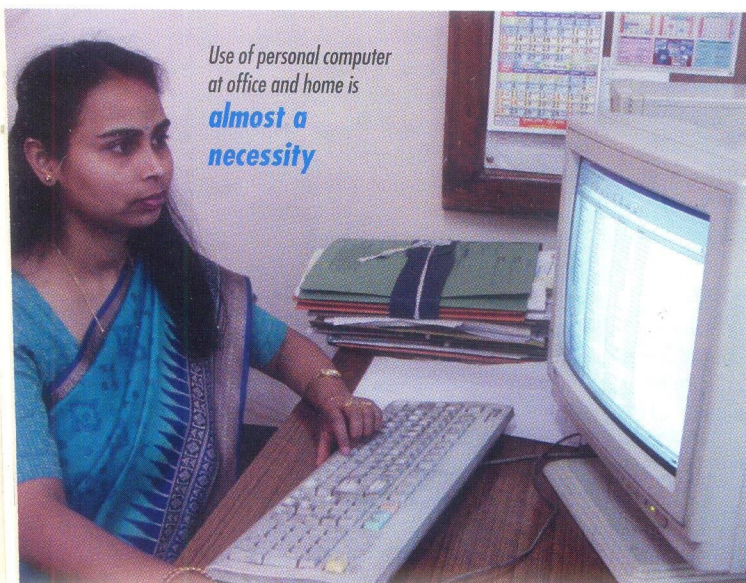
carry around. A computer whose case is oriented horizontally is also called a Desktop as opposed to Tower. Desktops use modular hardware and so, are easy to upgrade. The first widely successful desktop computer was the Apple II introduced in 1977.

## Laptops or Notebooks

In 1979, William Moggridge of Grid Systems Corporation created the first functioning portable computer: The Grid Compass Computer 1109 was used by NASA on the space



*Use of personal computer at office and home is almost a necessity*







Laptops

shuttle program in the early 1980's. The first commercially viable machine, however, was the IBM PC Convertible, introduced in 1986.

A laptop's screen is an integrated part of the unit, as is its keyboard. It has a small, flat design that makes it easily portable.

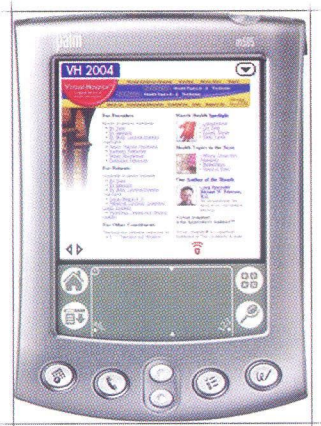
■ Notebooks smaller than an A4 sheet of paper and weighing around 1 kg are sometimes called sub-notebooks. Those

weighing around 5 kg are sometimes termed desknotes.

■ Powerful laptops that can match the computing power of typical desktops are sometimes known as desktop replacements.

## Tablet PC

Tablet PCs are complete computer systems in a slate format. There are two main designs: a slate design without a keyboard and a traditional laptop that converts to a slate. All tablets have touched sensitive displays that allow

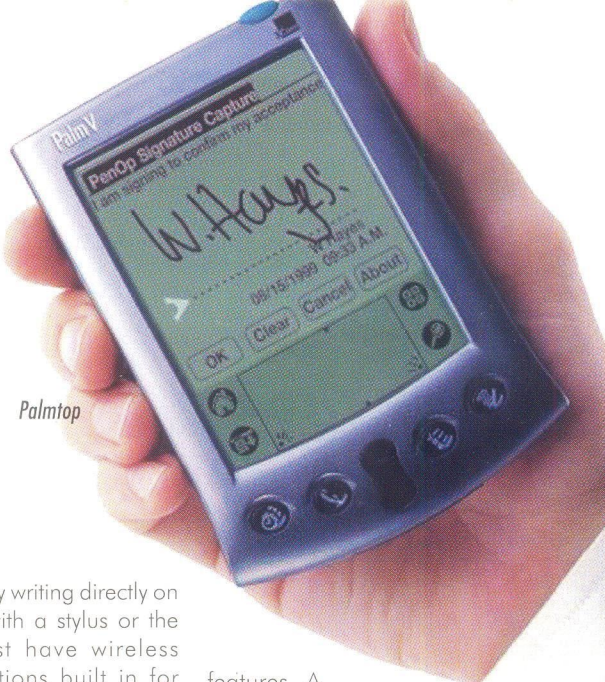


Personal Digital Assistant

data- input by writing directly on the screen with a stylus or the finger. Most have wireless communications built in for accessing the network for data storage and retrieval and for connecting to the Internet. Users may make notes on the tablet when not at the workstation, then put the computer in a docking station and use the keyboard at their desk.

## Personal Digital Assistant

Better known as PDA, this handheld device that combines computing, telephone/fax, Internet and networking



Palmtop

features. A typical PDA can function as a cellphone, fax- sender, Web browser and personal organizer. Most PDAs also incorporate handwriting recognition features as well as voice recognition technologies.

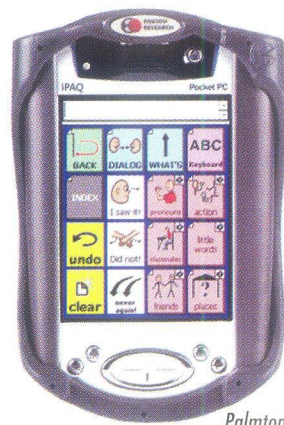
## Palmtops

Palmtops are computers that are larger than PDAs but smaller than notebooks.



Tablet PC

**All tablets have touched sensitive displays that allow data-input by writing directly on the screen with a stylus or the finger.**



Palmtop

## Wearable Computer

This is the Generation Next of computers.

Wearable computers are usually either integrated into the user's clothing or can be attached to the body. They may also be integrated into everyday objects that are constantly worn on the body, like a wristwatch or a hands-free cell phone. With head-up displays, unobtrusive





input devices, personal wireless local area networks, and a host of other context sensing and communication tools, the wearable computer can act as an intelligent assistant.

Wearable computing is an active topic of research and is especially useful for applications that require computational support while the user's hands, voice, eyes or attention are otherwise engaged. Applications include presentation of information to mechanics, military or paramilitary personnel, path-guide for the blind, real-time translation from one spoken language to another, and continuous medical monitoring.

## Embedded Computers

An embedded computer is a special-purpose computer system, which is completely enveloped by the device it controls. An embedded system has specific requirements and performs only pre-defined tasks.

## Wearable Computers

Applications include presentation of information to mechanics, military or paramilitary personnel, path-guide for the blind, real-time translation from one spoken language to another, and continuous medical monitoring.



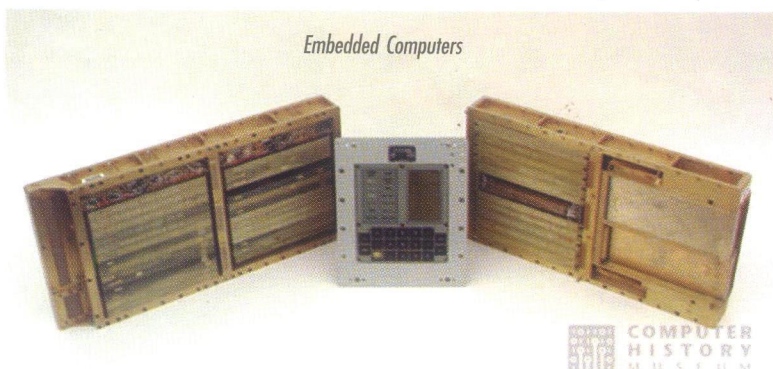
The first recognizably modern embedded system was the Apollo Guidance Computer, developed by Charles Stark Draper at the MIT Instrumentation Laboratory. The lunar spaceflights carried these devices to run the inertial guidance systems. The first mass-produced embedded system was the guidance computer for the Minuteman missile in 1961. Today, household appliances such as microwave ovens, washing machines, television sets, DVD players/recorders etc., contain embedded systems.



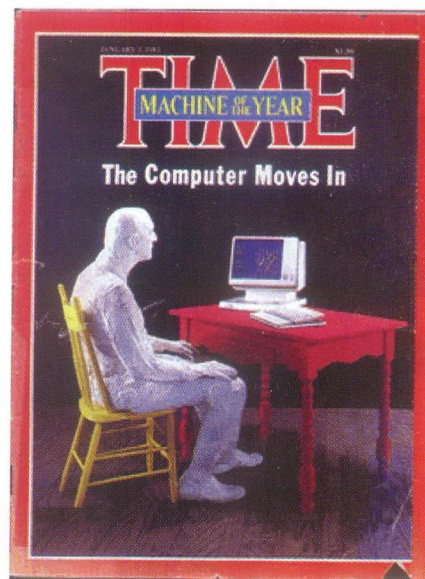
Mr Mauchly

**Mauchly had said,  
"There is no**

**reason to  
suppose the  
average boy  
or girl  
cannot be  
master of a  
personal  
computer."**



COMPUTER HISTORY MUSEUM



Man of the Year

## Man of the Year

Just how widely the PC has impacted our lives becomes apparent when we register that in 1982, Time magazine named the Personal Computer its Man of the Year!

## He Said It!

It is believed that it was computer visionary John William Mauchly (August 30, 1907 – January 8, 1980) who used the word **Personal Computer** for the first time. According to an article that appeared in the New York Times on 3 November 1962, Mr Mauchly had said, "There is no reason to suppose the average boy or girl cannot be master of a personal computer." These were prophetic words indeed.

Mauchly along with J. P. Eckert, also designed ENIAC, one of the first electronic digital computers, and UNIVAC I, the first commercial computer made in the United States. He is also credited for being the first one using the verb "to program" in his 1942 paper on electronic computing, although he did not mean it in the way it is currently used.

Dr Sukanya Datta



## Guidelines for Authors

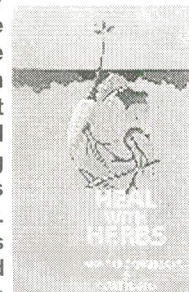
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## FAMILY PROBLEM

Two mothers and two daughters went to a shopping complex. They bought one pair of sandals for each of them. But it so happened that there were only three pairs of sandals. How do you explain that?

Prize  
Puzzle



Contributed by Kaulakbe, Lake View Hostel, Kohima Science College, Jotsona-797 002, Nagaland

There are three prizes for three correct entries. In case there are a large number of correct entries, the prize winner will be selected through a draw of lots. The decision of the Editor, *Science Reporter*, will be final. Fill up and mail your entries to:

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Age : ..... Sex : .....

Occupation : ☐ Student ☐ Housewife ☐ Teacher ☐ Professional ☐ Retired ☐ Other

Educational Level : ☐ Secondary ☐ Graduate ☐ Postgraduate

\*Please fill up the questionnaire at the back



## Car Search

The names of twenty car-manufacturing companies are hidden in this puzzle. You can search them vertically, horizontally, diagonally or even backwards.

A	D	N	O	H	A	T	P	H	L	M	G	I	A	B
X	D	A	E	W	O	O	Z	Y	F	E	O	Y	M	T
S	D	E	F	W	J	A	G	U	A	R	Q	W	J	V
K	B	C	N	A	S	S	I	N	T	C	S	S	X	U
O	X	L	M	R	N	F	N	D	O	E	A	D	Y	R
D	T	U	W	O	R	C	I	A	Z	D	X	F	C	E
A	U	D	I	Z	K	S	T	I	H	E	I	F	I	V
M	S	L	B	D	M	C	S	D	E	X	X	E	S	O
Y	A	O	Z	I	F	Y	U	O	O	G	T	R	A	R
L	R	T	O	Y	O	T	A	M	X	A	J	R	C	D
Z	O	U	T	Q	V	L	B	T	T	C	P	A	Q	N
D	Q	S	D	P	L	Q	C	A	Q	U	O	R	D	A
U	Z	R	W	K	K	E	K	H	R	T	A	I	F	L
O	O	I	J	E	I	T	P	M	L	O	A	B	H	G
F	L	W	K	L	A	M	B	O	R	G	H	I	N	I

The names of the prizewinners of the prize puzzles published in the August-December 2005 issues based on the draw of lots are given below:

### August 2005

**First Prize:** B. Sri Harsha, # 27, Matrukhaya, Brindavan Colony, Phase-2, Opp., A.S. Rao Nagar, ECIL Post, Hyderabad-500062

**Second Prize:** Ladda Rupesh O, Kanchan Ganga, Plot No.17, C-1 Town Centre, CIDCO, Aurangabad-431003

**Third Prize:** Mathew Jacob, Plot No 59, Crossstr.2, Shakti Vihar, Risali, Bhilai, Dist, Durg (C.G) – 490 006

### September 2005

**First Prize:** Liya Wangkhem, C/O Hijam Koaba Singh, Thangmiband Lowring, Pural Leikai, Imphal West, Manipur-795001

**Second Prize:** Devesh Saboo, 3<sup>rd</sup> Floor, Nath Bhavan, 30/A/124 Dr P.T. Laha Street, P.O. Rishra, Dist. Hooghly-712248

**Third Prize:** Shikha Raina, D/o R.K.Raina, 33/34 New Market, Bata Shoe Store, Tilak Nagar, New Delhi-110018

### October 2005

**First Prize:** Esther Lydia Durand, 18/Saravan Perumal Street, Pursawalkam, Chennai-600084

**Second Prize:** Soumita Kundu, C/O Soumen Kumar Kundu, Peada Para, PO Bongaon, Dist. North 24 Parganas-743235

**Third Prize:** Harshit V.Patel, Mahalaxmi, Opp. Alpa Park, Bharavnath Road, Maninagar, Ahmedabad-380008

### November 2005

**First Prize:** Rohen Agrawal, Flat No 21, Ratan Apartment, 7/154, Swaroop Nagar, Kanpur-208001

**Second Prize:** Arun Mohanray Mallya, Ganganagar Housing Colony, Curti, Ponda, Goa-403401

**Third Prize:** Tapar Kumar Mandal, Gobindnagar Housing Colony, Qr No. D/31, Side C, PO Kenduadihi

### December 2005

**First Prize:** Vishwajith V., # 66, 2<sup>nd</sup> 'A' Cross, 4<sup>th</sup> Main, Srinivasa Nagar, Bangalore-560 050

**Second Prize:** Gobinda Kr Biswas, Vill & PO+ P.S. Dhantala, Dist. Nadia, West Bengal-741202

**Third Prize:** Sachin K.Chavan, 2B/404, Devratna Nagar, Swadeshi Mills Road, Chunabhatti, Mumbai-400 022

Contributed by Sandip Pal, B.Sc. Hons, Illrd Year, Department of Zoology, Asutosh College, Kolkata, West Bengal

## Solutions to the puzzles published in the January 2006 issue

### Prize Puzzle:

#### Queen's Move

A-5 B-1 C-8 D-6

E-3 F-7 G-2 H-4

### Search the Body Parts

ABDOMEN	WRIST	KNUCKLE	CHIN
CALF	HAND	TOE	SHIN
BUTTOCK	PALM	HIP	EAR
WAIST	COLLARBONE	BACK	

### Multiplying Amoeba

The puzzle follows a simple series of numbers. First we identify how the number series works.

First day: 68 amoebas =  $4^3 + 4$

Second day: 130 amoebas =  $5^3 + 5$

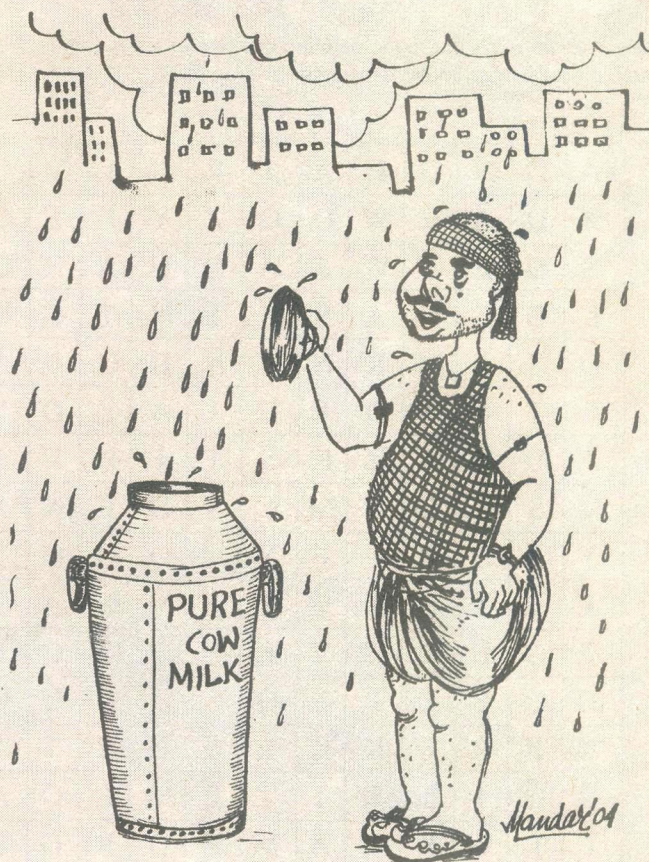
Third day = 222 amoebas =  $6^3 + 6$

Therefore, on the fourth day the population of the amoebas will be  $7^3 + 7 = 350$ .



CARTOONS by  
**MANDAR SENGUPTA**

7/19, Gadadhur Mistry, 2nd Bye Lane  
Howrah, West Bengal, Pin - 711104



"RAINWATER HARVESTING"

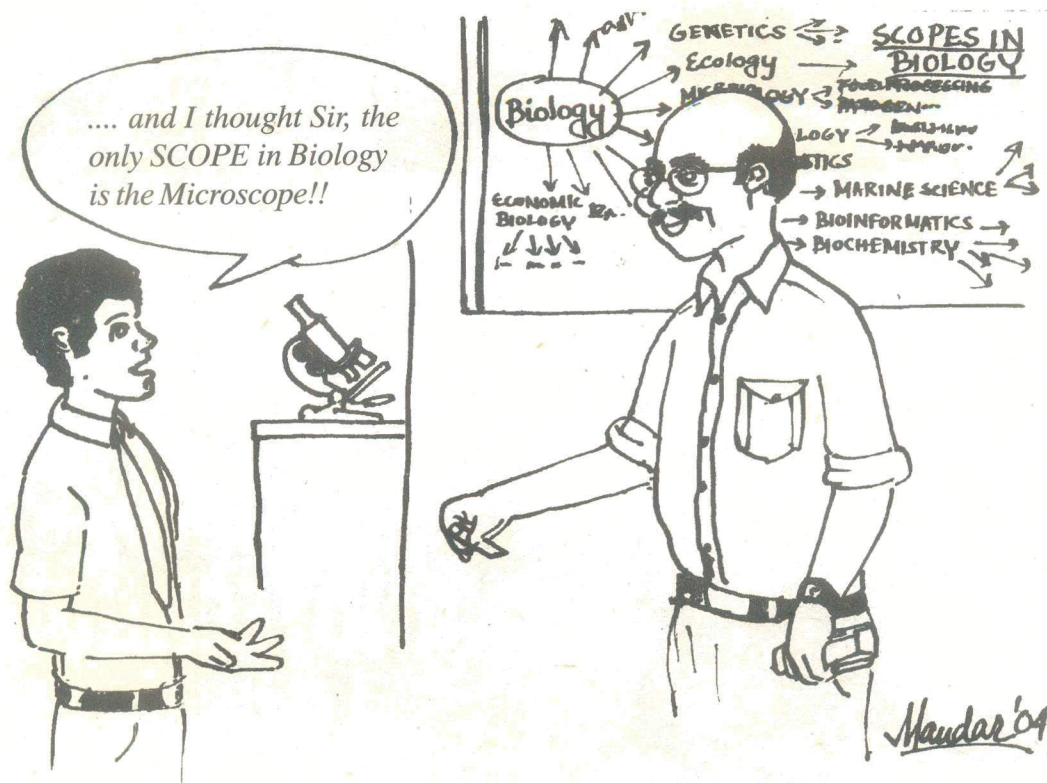
Dr. Mandar Sengupta  
MARINE BIOLOGIST  
&  
SCIENTIST

Next time, when I say 'Jelly', 'fish', Mr Marine  
Biologist, bring me 'Jelly' & 'fish' not a 'Jellyfish'.

Mandar'04

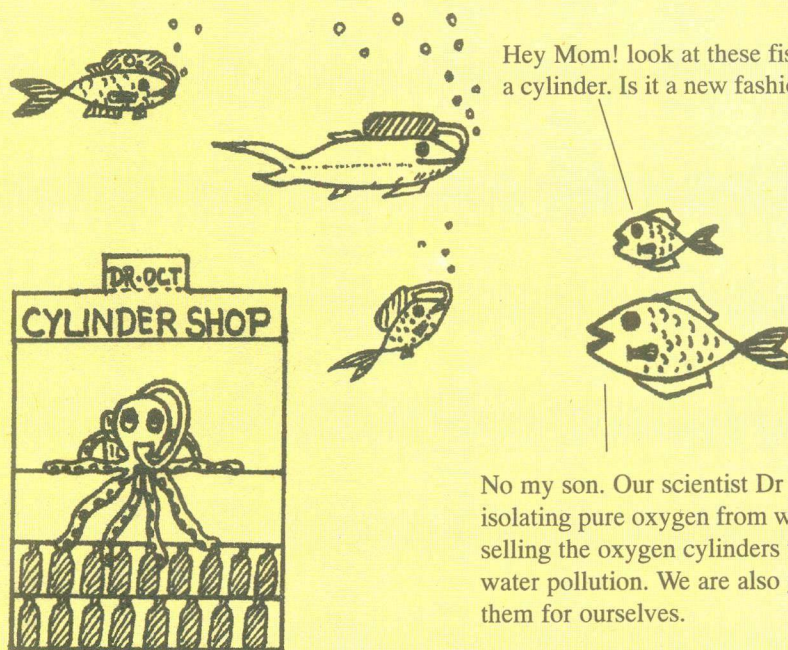






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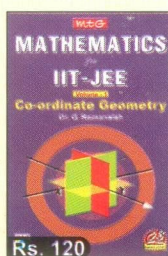
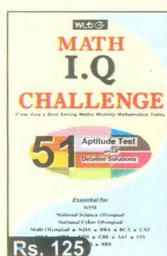
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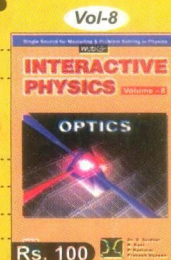


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